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San Francisco, Calif.

September 15, 1926
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IN THE ELEVEN WESTERN STATES

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Journal of Electricity entered as second class matter February 17, 1921, at the post office at San Francisco, under the Act of Congress, March 3, 1879. Published the 1st and 15th of each month at 883 Mission Street, San Francisco, California

SEP 27 '26

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Journal of Electricity

With which is consolidated the "Electrical Journal" and the "Journal of Electricity, Power & Gas."

Devoted to the Economic Production and Commercial Application of Electricity

IN THE ELEVEN WESTERN STATES

A McGraw-Hill Publication

Published Semi-Monthly

Established 1887

C. T. HUTCHINSON, Editorial Director

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VOLUME 57 SAN FRANCISCO, SEPTEMBER 15, 1926 NUMBER 6

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McGRAW-HILL COMPANY OF CALIFORNIA — 883 Mission St. — SAN FRANCISCO

Northwest Office: 1206 Spalding Building, Portland, Ore.

Publishers of JOURNAL OF ELECTRICITY

JAMES H. McGRAW, President — C. T. HUTCHINSON, Vice-Pres. & Gen. Mgr. — R. N. PHELAN, Secretary & Treasurer

WASHINGTON, Colorado Building
CHICAGO, 7 South Dearborn Street
PHILADELPHIA, Parkway at 16th St.
CLEVELAND, 401 Guardian Building
ST. LOUIS, Star Building
NEW YORK, Tenth Ave. at 36th St.

Subscription rates in United States, Canada, Mexico, Porto Rico, U. S. Possessions, Argentina, Bolivia, Brasil, Colombia, Costa Rica, Cuba, Dominican Republic, Ecuador, Nicaragua, Panama, Guatemala, Paraguay, Peru, Honduras, Salvador, Uruguay, and Spain, $2.00 per year, 2 years $3.00. Elsewhere $3.00 Gold (13 Shillings). Single copy, 25c. When change of address is required, both old and new addresses must be given. Notice must be received two weeks before change takes place.

Copyright, 1926
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Entered as second-class matter Feb. 17, 1921, at the Post Office at San Francisco, California, under Act of March 3, 1879.

Member Audit Bureau of Circulation

Printed in U. S. A.

McGRAW-HILL PUBLISHING COMPANY, Inc.
New York

Publishers of
American Machinist—European Edition
(*Published in London*)
Industrial Engineer
Electrical Merchandising
Chemical and Metallurgical Engineering
American Machinist — Successful Methods
Electrical World — Electric Railway Journal
Engineering and Mining Journal
Bus Transportation — Engineering News-Record
Coal Age — Radio Retailing — Power

"Circuit Riders"

"CONVENTION Circuit Riders" is a term which might be aptly applied to the members of the editorial staffs of technical journals. They probably attend more conventions than any other man in the industry which their paper serves. Theirs is the job of bringing back a permanent record so that the important thought brought out in the convention sessions will not be left to memory alone.

During the fortnight just closed two important conventions have taken place in the Western states. The "Circuit Riders" have attended both. In the next issue of the Journal of Electricity will be a complete report of the Pacific Coast convention of the American Institute of Electrical Engineers held in Salt Lake City, Sept. 6-10. The outstanding contributions to the art presented in the many papers as well as the most interesting parts of the discussions will be digested.

At Glenwood Springs also the Rocky Mountain Division of the N.E.L.A. and the Colorado Public Service Association held their joint convention Sept. 13-16. Once again the "Circuit Riders" were on the job and the papers and discussion relating to the problems of the electrical industry in the Rocky Mountain states will be made the subject of a complete and comprehensive report.

Both of these reports will reflect the advancement of the industry and will present its ideals and aspirations. Both will be well worth reading.

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EDITORIAL

Baker Fishway Points the Way

POWER and fish interests alike rejoice at the success of the fishway at the 260-ft. Baker River dam of the Puget Sound Power & Light Company, as described in this issue. Here is the first instance in which the spawning cycle of migratory fish has been unimpeded by a high dam. In the spring of this year a few thousand mature sockeye salmon were passed over the dam to the spawning grounds above, and several times as many thousands of offspring of a similar, prior run proceeded down on their way to the sea, which is the natural, immutable law of the salmon in its life cycle.

It has been alleged, and generally is believed to be true, that salmon will not of their own accord ascend a fish ladder of an elevation greater than fifty feet. When the fishery interests of the Northwest saw that the power interests were contemplating high-dam developments on spawning rivers this fact caused some alarm, and a potent protest was set in motion. But the fish men found the power companies alive to the importance of the fish industry, cognizant of the spawning problem, and eager to work out a solution in co-operation with state officials and commercial fishermen. Hydroelectric engineers felt that a mechanical lift could be used successfully; fishermen and game commissioners harbored some doubts. It was agreed that the problem was only about one-half engineering, in that the other half was how to get the fish to enter the mechanical device. Engineers and icthyologists put their heads together, some experiments were made, and finally W. D. Shannon, superintendent, Stone & Webster, Seattle, builder of the Baker dam, working with fish and game commissioners of the state, demonstrated in actual practice that the obstacle is not insurmountable.

The Baker fishway applies a number of new principles in fishway design and operation. In the first place it requires the fish to swim to an elevation of only about forty feet and then carries them in a tank of water the balance of the height of the dam and dumps them into the reservoir above. In the second place the fishway entrance is at the power house, or some thousand feet below the dam, and to keep the fish from nosing up to the base of the dam a rack is stretched across the river just above the power house. Further, the swift tail water from the wheels is used to attract the fish to the entrance to the fishway, which is adjacent to this tail water. Lastly, the ladder part of the fishway has steps of only two-feet elevation requiring a minimum, and therefore a less tiring jump, and in addition each step is equipped with a trap device to keep the fish from drifting back down once it has entered the ladder. This latter feature of the design has led to some speculation as to whether or not the fish of their own accord might proceed the entire distance over the dam if given a sufficiently flat grade, but such a ladder would present additional engineering problems and probably would be as expensive as the present hoisting device.

The significant thing about the Baker River success is that the fish are diverted from their natural course upstream, are practically trapped, and are delivered without injury to the stream above the dam. In this lies the hope of ultimate solution of any similar problem in the future, which means that hydroelectric development on spawning rivers may continue without harming the great fish industry on the Pacific Coast. What has been accomplished on Baker River can be accomplished elsewhere. Each problem will be an individual one; but each can be worked out by taking into consideration the nature of the stream and the habits of the fish running in it, and then building suitable devices to meet the conditions and operating the whole to suit the characteristics of the run.

Some mention of the other and equally important half of the problem should be made—that of getting the young fish safely down below the dam again when they migrate to the sea. Some experts had held the opinion that a drop over the dam would not hurt these fry; others thought they might go through the runners of the water wheels and live to be caught or spawn again; still others opined that both were wrong. But no one **knew**, and it remained for the Baker experiment to disprove or verify at least one theory. What has been proved on the Baker River is that the young fish in schools actually do make the 260-ft. drop in a column of spill-water over the dam without injury. Thus has the spawning cycle been completed, and thus have been settled several important points of a controversy that two years ago seriously threatened hydroelectric development in the Northwest.

Oregon to Vote on State-Owned Power System Run by "Housewives"

OREGON voters will find on the ballot in that state on Nov. 2 an amendment to the state constitution labeled "Water and Power Bonding Amendment." This measure was sponsored by the Housewives' Council, Inc., of Portland and only received a place on the ballot after a court fight to determine whether or not sufficient signatures had been secured to initiate it. The proposed amendment is patterned in most respects after the famous or infamous California $500,000,000 Water and

Power Act which has been defeated twice and which will be voted on for a third time at the coming election. In some respects, however, the Oregon legislation is even more impracticable and visionary.

In the first place the Oregon amendment names the five members who will constitute the Water and Power Board for the first four years, the majority of whom will be in control. Not one of the individuals named has any experience to qualify him or her to administer an enterprise concerned with power, irrigation and domestic water projects. From the standpoint of one familiar with the intricacies of the electric light and power business this is amusing. From the standpoint of the taxpayers who will be forced to make up the deficits and pay for mistakes it is tragic. Under private management such a business could be successful only when managed by men of long experience who had demonstrated marked executive and organizational ability. The character of executives developed in the electrical industry amply demonstrates this point. To invest such a board with the unlimited power to engage in the business contemplated by the provisions of the amendment and to place in inexperienced hands the expenditure of the $52,944,000 plus such other money as the board should need would be folly of a character beyond the wildest dream of a 1905 Socialist.

Some of the other objectionable features of the act, together with its complete text, are published on another page of this issue. After a careful reading every member of the electrical fraternity ought to be imbued with the determination to oppose such radical legislation not only from the standpoint of protecting his or her industry but of protecting the interests of the public as well.

Another Example of Unprofitable Political Administration of Hetch Hetchy

OVER the protests of the city engineer and city attorney, the San Francisco supervisors have ratified a contract with the Modesto Irrigation District for furnishing the district with standby electrical service. Under the terms of the contract Modesto will receive standby to the extent of 3,000 kw. for a flat charge of $4,200 per year and a kilowatt-hour charge of 4.7 mills for energy used.

Obviously this is a fine stroke of business for the Modesto Irrigation District and an exceedingly poor one for San Francisco. Under rate schedules fixed by the California Railroad Commission standby service is furnished on the basis of a price per kilowatt per month or year plus a rate per kilowatt-hour for energy used. For such service from one of the existing utilities Modesto would be forced to pay a rate from $10 to $24 per year per kilowatt of demand plus 6 mills per kilowatt-hour. The city engineer estimates that the standby charge alone for a similar service from the Pacific Gas and Electric Company would cost Modesto $45,000 per year.

Prior to the passage of the contract the Pacific Gas and Electric Company indicated to city officials that it would consider void its obligation to pay for the 3,000 kw. of plant assigned to Modesto. Therefore the city stands to lose $96,000—the sum which it ordinarily would receive from the utility for this much capacity—less the $4,200 which Modesto is willing to pay.

Modesto applied for this service under the terms of the Raker Act which requires that power be served to irrigation districts upon demand for "pumping sub-surface waters for drainage or irrigation or for the actual municipal purposes of municipalities within the districts (which purposes shall not include the sale to private persons or corporations) at such price as will actually reimburse the said grantee for developing and maintaining and transmitting the electrical energy thus sold." Since much of Modesto's electrical business is commercial and since obviously San Francisco is not being reimbursed for its cost of furnishing service, it would seem that the contract itself will be subject to much controversy and possible court action. At any rate its ratification is a typical example of the unbusinesslike, uneconomic and unprofitable administration of a complicated business by a political organization totally lacking in experience or qualifications.

Why Always a Gas Range in the Kitchen Scene?

NATIONAL magazines circulating to homes and firesides and known as family magazines are almost as thrilling to the average reader in the advertisements they contain as in the thin lining of stories between them. The reason is not far to seek, since advertisers generally have learned the knack of making their advertisements dramatic, more dramatic sometimes than that which the advertising agency designates when it specifies that its copy stuff shall be "next to live reading matter."

Moreover it is interesting to the electrical man to notice that in all the superb advertisements depicting charming kitchen scenes, it is always a **gas** range that fills the picture. The inference is all too plain. Gas ranges are already being taken for granted to such an extent that it seems the natural thing to include them in every domestic scene, whether the advertisement be one advertising anything from baking powder to building materials.

This is all very well, but it helps the electric range not a whit. Yet it might help the electric range to a considerable degree without in the least hurting the advertised product, whatever that might be. The presence of an occasional electric range in the kitchen scene should help to accustom the public to the idea that electric ranges, too, may be taken for granted, that they are common to many homes.

Some manufacturers of electrical appliances will say that they are powerless to affect the copy of advertisers of other products. This largely is true. But it is significant likewise that the advertising agency which handles the advertising for an electric manufacturer sometimes handles the advertis-

ing of other products which in turn depict these products in kitchen surroundings, with the inevitable gas range in the offing.

A little diplomacy, a kindly suggestion, perhaps a joking remark has been known to turn even the affairs of state from one channel to another. Is there not a possibility that the agency handling other accounts than that of the electrical manufacturer might not be willing to place a modern electric range, not necessarily of any particular make, in that kitchen back drop which is to be seen behind the particular product advertised in this week's periodical?

The Princess Who Longs for Our Labor-Saving Devices

ROYALTY has again visited our Western domain. The Crown Prince and Princess of Sweden, in their tour of the United States, spent many days on the Pacific Coast. The hospitality of the West was tendered to them on every hand. But when asked what of all the things she had seen in America Princess Louise liked most, the Crown Princess of Sweden expressed one simple and sincere desire:

"If I could take home to my country one thing for my people, I should like to take your labor-saving devices for the home," she said.

Aside from the unselfishness and deep interest in the welfare of her own people so commendably displayed in her simple expression, the remark is one that should make Americans consider for a moment what these devices mean to their own civilization. For centuries the idea has prevailed and the fact persisted that the best in the world was that which royalty possessed. And yet we may find in this instance that royalty envies for its own people and its own country some of the mechanical servants which are the commonplace equipments of even our humblest homes.

The Wireman Who "Knocks" the Red Seal Plan

THERE are people who never know when they are well off. Among them may be classed the wireman who, either because he doesn't know any better or because he has the wrong idea as to his job in the world, "knocks" the Red Seal plan to the very customer whose acceptance of it gives him work and bread and butter. Yet, strange as this may seem, there are many wiremen working for electrical contractors who have not yet learned enough about the Red Seal plan to know what it means to them.

Evidently thinking that he was doing the home-owner a favor by doing so, a wireman working on a Red Seal home recently was overheard by a representative of the California Electrical Bureau belittling the plan. "What are you going to all this expense for? You won't need all these outlets in here," the owner was told by the electrician. To the owner the electrician's advice, as a man who presumably knows whereof he speaks, bore weight.

Here lies a big responsibility upon the electrical contractor and upon the organizations promoting the Red Seal plan. The Bureau has realized its responsibility and plans, it is said, to reach the electricians by addresses at meetings of their unions. But this will not reach them all. The major responsibility still rests with the contractor to acquaint his own men with the Red Seal plan and what it means not only to the electrician himself but to the industry and, more important still, to the home-owner.

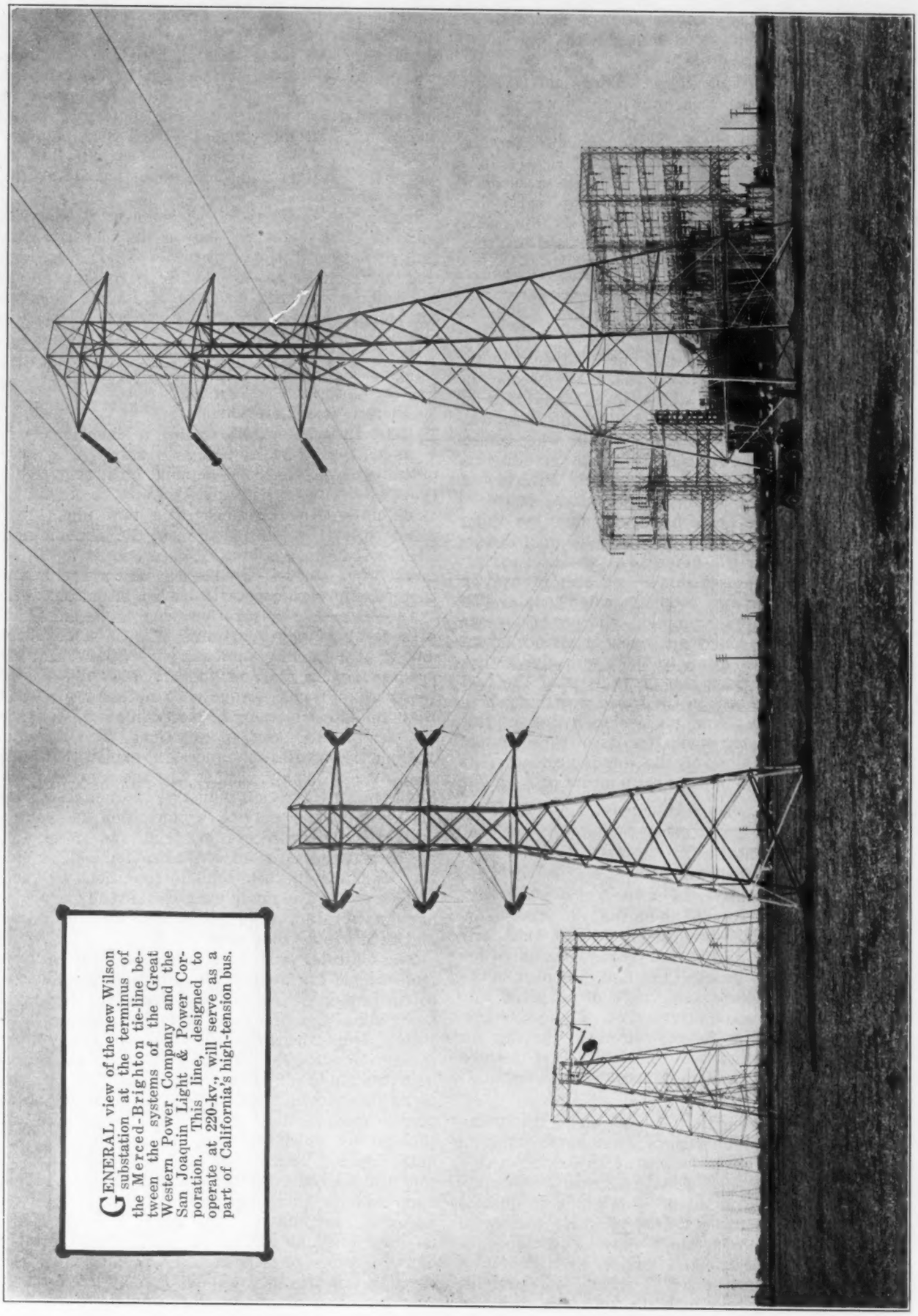
In the final analysis the wireman who talks himself out of a high-class job on the basis of some fancied service to the home-owner is not even doing that home-owner any good. He is robbing him of convenience and the pleasure of having adequate equipment to take care of every electrical need he may wish to supply.

For the Good of Electric Refrigeration

FROM an economic standpoint, a boom in any industry is just as bad as a surge in a power pipeline, or an abnormal demand on a central station. Strain, even rupture, is likely to follow. A quick consumer-acceptance of a new idea before the industry is organized to meet the demand on so large a scale brings lines of care and worry in the faces of executives all the way down the line in their attempts to cope with such a situation.

The electric refrigeration idea is beginning to present all of the symptoms of such a condition, and it is becoming increasingly evident that the progress in the state of the art must move much faster than would normally be necessary in order that this latest blessing of electricity may not meet with the wrong kind of reaction. The thousand and one necessaries to succeessful exploitation must be provided quickly. What are these necessaries? Shall the refrigeration industry, its manufacturers, distributors and service organization be content with the slow process of trial and error, and lag behind the surge of consumer demand, or shall they examine the field and its conditions by study and survey of the many examples already available, and know rather than guess just what is needed and then supply that need?

The editorial staff of the McGraw-Hill electrical publications has undertaken this work as a service to the industry. As this is written, the country is being studied at first hand from the Atlantic to the Pacific, from Mexico to the Canadian line, by personal contact. The central-station officials in all departments, the jobber, dealer, service men are being interviewed with the idea of obtaining an accurate cross-section of the best experience and thought by which, through the correlation of the data obtained, conclusions may be evolved that will constitute a basis for the determination of policies upon definite knowledge and understanding of the needs of the industry. No effort is being spared in order to make of this one of the most comprehensive series of studies ever produced, so that through this service the industry may live up to its best traditions of service to the public.



GENERAL view of the new Wilson substation at the terminus of the Merced-Brighton tie-line between the systems of the Great Western Power Company and the San Joaquin Light & Power Corporation. This line, designed to operate at 220-kv., will serve as a part of California's high-tension bus.

Fish Ladder at Baker River Dam Points Way to Solution of Big Problem

CONFLICT over the placing of high dams across streams in which fish are wont to go for propagation has agitated both power and fishery interests and occasioned some short-sighted and sentimental legislation. Meanwhile by co-operating with fisheries and government officials the Puget Sound Power & Light Company has solved the problem and proved it by actual test. This article demonstrates that a simple mutual acceptance of responsibility and an application of engineering principles do more to conserve our fisheries than all the legislation the sentimentalists may devise.

SETTLEMENT may come in the conflict of power and fishery interests which for years has centered in the placing of high dams in streams of paramount value in salmon propagation. Experience with the ingenious fish ladders erected at the Baker River plant of the Puget Sound Power & Light Company, on the Baker River, Washington, has shown that there can be no reasonable height limit on dams over which fish cannot be raised unharmed.

Young salmon, from six to seven inches in length, moreover, make a 260-ft. leap from the crest of the Baker River dam to its base at the rate of 10,000 an hour and show no ill effects from their leap. Mature fish on their way to spawning grounds are successfully transported from the base of the dam near the power house to the lake above. These are accomplishments of the state department of fisheries of Washington in co-operation with the Puget Sound Power & Light Company and other interested authorities.

The leap from the summit of the dam to the river bed already has been made by literally millions of young fish with casualties so few as to be negligible. With sockeye salmon running enough fish have made their way from the bottom upward absolutely to set at rest any possibility of doubt as to the success of experiments worked out over a period of two years and of the efficiency of equipment installed at a cost of more than $75,000 for this purpose, according to state department of fisheries experts.

As far as was known up to the time of this installation no salmon had ever gone over a ladder where the difference in elevation was greater than 49 ft., but with three important power developments under way, each involving a high dam that threatened to end salmon migration in its particular stream, a meeting was called two years ago by institutions closely allied with the fishing industry of the state to discuss this vital problem with the power companies, considerable doubt being expressed as to the possibility of transporting fish beyond the previous record of 49 ft.

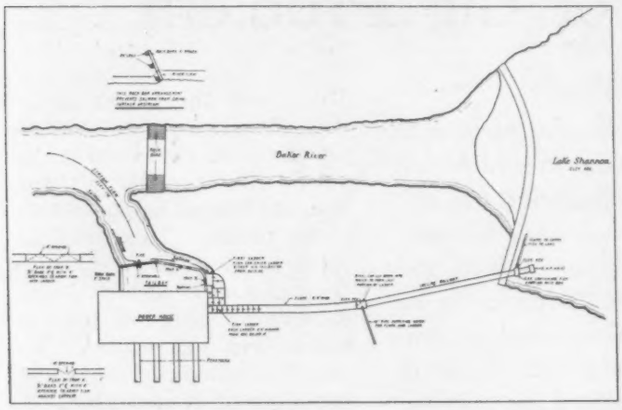
The three power developments considered were the Kettle Falls development in eastern Washington, the Priest Rapids development on the Columbia River and the Baker River development in Skagit County. Of these three developments, the Baker River was the closest to perfection of its plants. This development involved the construction of a dam 265 ft. high, spanning a gorge in a river which was one of the two sockeye salmon streams in the state of Washington.

Out of the conference came the formation of a committee composed of representatives of the fish commissions of Washington and Oregon and of the power industries of the two states. The purpose of this committee was to co-ordinate the various ideas in connection with the problems and to find out whether or not the two industries could live on a stream side by side without undue interference. An executive committee was formed with E. A. Simms, chairman of the state fish commission of Washington, as chairman of the committee and with Prof. John Cobb, dean of the fisheries department of the university, as secretary. This committee raised the sum of $5,000 which was apportioned between the two states and between the various power companies in both states.

After a number of meetings of the committee, a plan of action was decided upon by means of which certain experiments could be performed which might assist in the solution of the problems involved. In the meantime, however, the progress of the plans for the Baker River development was developing to such an extent that the further conducting of experiments was out of the question insofar as they could be expected to be useful in connection with this particular development.

It became necessary, therefore, for the engineers of the power company to go directly to the state fish commission and ask for help in designing the necessary forebays, traps, fish ladder and other devices necessary if salmon were to be transported successfully over the Baker River dam. This appeal was made directly to Mr. Simms and to Charles Pollock, state supervisor of fisheries, who in turn assigned L. E. Mayhall, state superintendent of hatcheries, to confer with W. D. Shannon, general superintendent, division of construction and engineering, Stone & Webster, and the power company's engineers in the hope the problems could be solved.

It then developed that there were a number of conflicting ideas in regard to the whole knowledge salmon could be retained at each point of its jour- studies that the problem would have to be handled largely in an engineering manner, using such knowl-



Drawing showing relative locations of the various items making up the fish ladder system, including the bar to keep the fish from going up to the foot of the dam, diverting them to the tailbay, up the steps of the ladder, flume and inclined railway to the lake above.

edge as the department of fisheries could furnish. With the co-operation of Mr. Pollock and Mr. Mayhall, various devices were worked out, and, after acceptance by the executive committee, were quickly constructed in connection with the Baker River development.

Must Retain Fish in the Ladder

During the course of the construction and while some of the experiments were being made with a run of steelhead salmon, it developed that if the salmon could be retained at each point of its journey in the fish ladder, one of the difficulties of handling the fish would be solved. There was developed, therefore, a trap, which was later christened "the Mayhall trap," by means of which a salmon could glide from one pool of the ladder to another, but in no way could it return.

This has led the engineers to believe that the statement that fish could not negotiate a ladder higher than 49 ft. was purely a myth, and it is now believed that it is a simple matter, by using the method in use at Baker River, to carry fish to almost any reasonable height. It was also believed at first that the various jumps in the fish ladder should be made a maximum. In such case a salmon might have to try several times before making the jump. The engineers believed, however, that if the jump could be made the minimum it would then make the jump the first time and so conserve its strength that it could make an indefinite number of jumps in a properly constructed ladder.

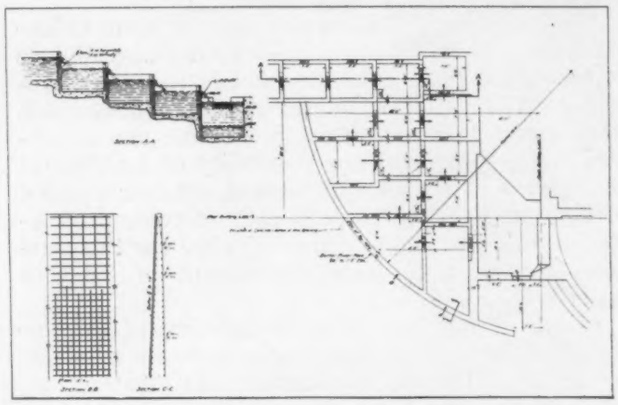
When it is considered that there is a difference of 600 ft. between tide water and Baker Lake and that in days gone by salmon would negotiate this distance in about four days, there was no reason to believe that if a fish ladder were constructed by easy stages, a fish could not negotiate the same height. For this reason a ladder was constructed with the difference in elevation of only two feet, with the result that the salmon expends very little effort in negotiating the jump from one pool to another.

Another important feature of the ladder is that each pool has sufficient size so that the salmon can, if it wishes, rest a while before making another jump. The whole problem has simply been an engineering application of old ideas.

The Plan as Developed at Baker River

The entire scheme of the Baker River ladder consists of a huge forebay where a fish can fight the swift water and when tired enter into the traps on the upstream side of the fishbay, and, once entering one of these traps, cannot return. The ladder begins at this point and goes by easy stages up the canyon walls until it reaches a series of flumes built along the river channel. The length of the flume is about 700 ft. The last step of the ladder has for a pool a movable car. When a quantity of fish of sufficient number has negotiated the last pool of the ladder, the car, which is fitted with a door, is then pulled up a steep incline where the salmon, still in water, are emptied into a trough leading to Lake Shannon above. The salmon, therefore, do not at any time leave the water and are simply transported in a large tank full of water to the lake above.

During the spring of this year, the last half of the steelhead salmon run was successfully handled over the ladder. During the third week of June the first of the sockeye salmon arrived and quickly found their way into the ladder. After being placed in the lake above, the fish took just about three days to reach the trap at Baker Lake where the government catches them and from which they are towed in live boxes to the upper end of Baker Lake.



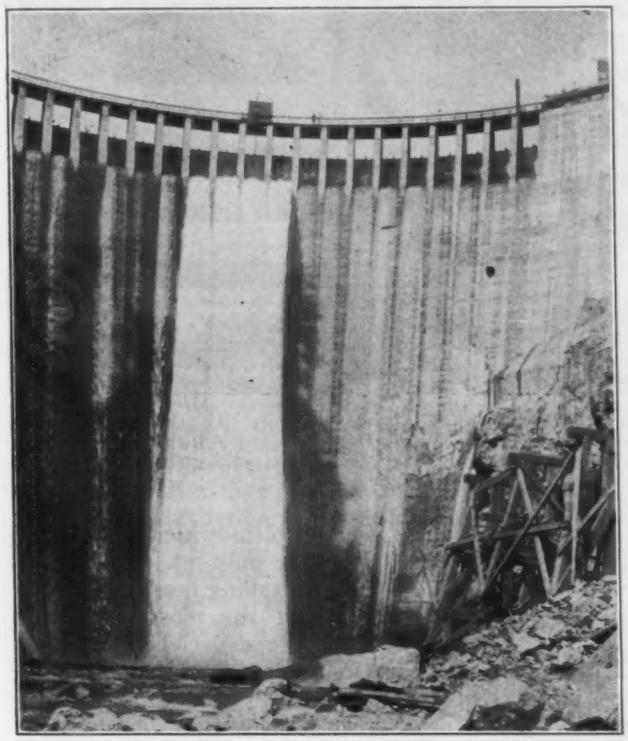
Detail of the fish ladder at its entrance, with sections showing construction plan and rack-bar at the entrance which keeps fish from leaving the ladder.

Here the salmon are allowed to ripen and are later spawned, the eggs being hatched in the United States hatchery on the shore of the lake.

Over the Top

Another very interesting problem in connection with Baker River dam was that as to just how the young migratory salmon would behave in going

over the dam. Very early in the discussion the United States commissioner of fisheries, Henry O'Malley, made the statement that from his experience he would not worry about young salmon going over the dam. While this involved more than a 200-ft. drop Mr. O'Malley seemed to think that the young fish would make it nicely. His prediction proved true. It is indeed a pretty sight to see the young migrators going over the dam and appearing at the power house about 1,000 ft. below in as



Young migrating salmon tumble by thousands down the 260-ft. waterfall in front of the Baker River dam and are unharmed.

healthy a condition as one could wish. Mr. Russell, the bureau of fisheries' representative in the Northwest, said that this was the first time he had ever had the opportunity to see young migratory salmon and to study them in such favorable circumstances.

One of the gates was left open during the run of young salmon in June. A spectator could stand on the bridge above the gate and see what looked like a bushel basket full of young fish go out through the opening, wriggle their fins and tails in the spray and sunlight so that they were all easily visible and plunge with the heavy stream of water 260 ft. to the pool below. These young salmon, from six to seven inches long, made a beautiful sight as they fell in the spray in front of the dam.

Uninjured by the Leap

The salmon fell in a deep pool of water below and were apparently uninjured in any way. Occasionally a young salmon would jump out of the waterfall and would be injured against the dam, but Mr. Mayhall declares that "the percentage of loss is very small."

It was estimated during the heavy run that the young salmon were passing over the dam at the rate of about 10,000 an hour, so it may be seen easily that many millions of young migratory fish have successfully passed over the dam this year.

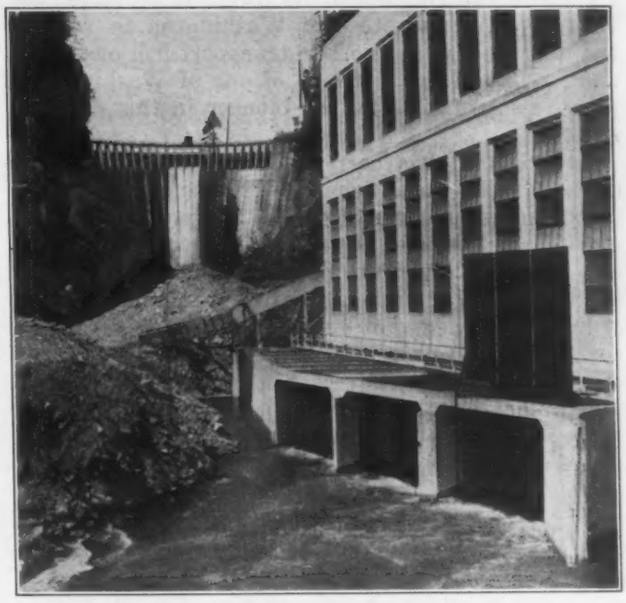
Mr. Mayhall further stated in his report to the state supervisor of fisheries that "the fish are visible passing over the rack at the power house. They are still in schools, active, handle themselves well in the swift current and from all appearances are no worse off as a result of their trip over the dam."

The photographs and drawings accompanying this article show in detail the position of the trap placed across the river which prevents the young salmon from going beyond the entrance to the fish ladder and also show in some detail the fish ladder itself.

What it Means to Both Industries

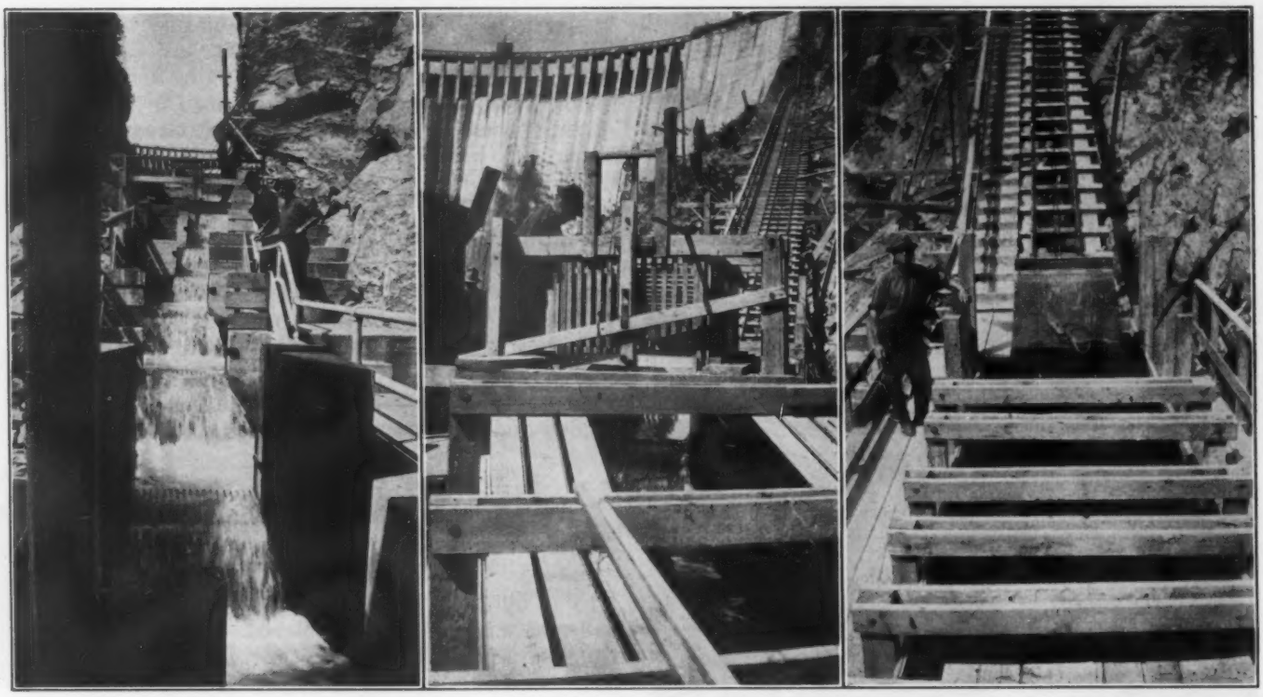
The success of the whole enterprise means a great deal to both the salmon and the power industries of not only this state but of the whole country, fisheries experts have declared. This is the first time so far as is known that the migratory fish have been successfully transported over a high dam. It is predicted that no longer will the power companies be restrained from building as high a dam as is needed across any of our salmon streams and no longer will the great salmon industry of the state be menaced as a result of such power dams.

The conclusion of the successful experiments at Baker River and the installation of a successful



Salmon enter the tailbay of the Baker River power house through the openings in the rack-bars and thence enter the latter, seen starting around the corner, to get to the top of the dam, visible through center.

means of getting migratory fish over a high dam in the future will be pointed out by the power and salmon industries as what can be done. Because of this successful installation it is expected that the two great industries of the West will work in



Up the steps of the fish ladder (shown in the first picture, left), go the salmon, two feet at a step. At the top they enter a flume which carries them to the last step, a step which takes them into the cage of the inclined railway, as shown in the center photograph. Fish and water are then elevated as shown at the right up the inclined railway to the dam and dumped into the lake.

harmony toward the development of the region's great assets.

Oregon has dropped out of the picture and has gone into experiments of its own. It remained for the people of the state of Washington to witness the first successful effort to transport fish over high dams. It was the privilege of one of Washington's power companies to be the pioneer in this development.

Great credit has been given by the fisheries industry to the state fisheries department of Washington for its co-operation with the power company in the solution of the problems involved. Credit also has been given the power company's engineers in attacking a problem entirely outside of the ordinary knowledge of engineering and solving it in such a way as to be of great benefit to the people of the state.

The success of the fish ladder installation at the Baker River dam suggests that co-operation between power company engineers, fisheries and government officials may result in a satisfactory solution of other similar problems. It suggests also that legislation preventing development of streams for power generation because such streams happen to be the usual haunt of spawning fish at certain seasons of the year is legislation which is wasteful of the natural resources of a state. Such legislation is usually inspired by well-meaning but misinformed people and supported by those of tender sympathies and by sportsmen whose concept of the welfare of the state is measured in terms of their own "catch" of fish.

Patience and good engineering thus may bring about a solution of the problem which those who have fostered legislation have only made more difficult to handle, meanwhile curtailing necessary power development. Indeed one of the most significant things about the Baker River experience has been Mr. Mayhall's report to the government, in which he has stated that "the power company deserves great credit for the consistent and conscientious effort it has contributed in making this fishway problem a success."

Electric Wire Manufacture in Japan.—There are eleven companies in Japan manufacturing electric wire, according to U. S. Commerce Reports. Their combined capital is estimated at $16,145,000 with individual capitalizations ranging from $66,300 to $6,231,000. The manufacturers have shown particular skill in the production of various lines of small and medium gage copper wire, both bare and insulated. In 1909 the production of wire and cable totaled $2,941,500 in value; it increased to $24,156,500 in 1919, and amounted to $43,736,300 in 1924. A great stimulus was received by this industry as a result of the decreased imports of foreign-made wire during the World War; production of wire and cable steadily increased. Although the manufacture of submarine telegraph and telephone cable has not been developed so greatly as has that of wire, it is believed that cable of this kind for home use ultimately will be manufactured entirely in Japan. Domestic manufacturers of electrical wire not only supply practically the entire home consumption, but export a considerable quantity to China, Kwantung leased territory, Hongkong and the Dutch Indies.

Proposed Oregon Water and Power Amendment

A MEASURE proposing to put the state of Oregon in the electric light and power business will be voted upon by the electorate of that state at the general election Nov. 2, 1926. The proposed amendment was sponsored by the Housewives' Council of Portland and achieved a place on the ballot only after a court fight to determine whether or not sufficient signatures had been secured to initiate it.

The amendment is patterned in many respects after the $500,000,000 California Water and Power Act which has been been twice defeated by the voters of that state and which will appear on the ballot for a third time this November. Some of the more objectionable features of the California legislation have been eliminated but in certain respects the Oregon amendment is even more visionary.

The Oregon Water and Power Amendment creates a board of five members with majority control. It goes even further by naming the members to hold office for the first five years. None of those named has had any experience to qualify for the post of administering so intricate a business as the development of water power projects and the generation of hydroelectric power.

This board would be clothed with unlimited and unrestricted power "to do any and all things necessary or convenient for carrying out the purposes of the amendment. It would be responsible to no one. It could withdraw from appropriation and could use all water and materials in or on the lands of the state. Thus it would have complete control of all natural resources. It could go into any kind of business it considered necessary. It would have the right to acquire property by eminent domain. In venturing into any project, hydroelectric, irrigation or domestic supply, no matter how large a sum of money involved, the board would be required to do nothing more than make an investigation and file with itself a report made by its own employees under its supervision. It could then spend any or all of the moneys provided by the amendment for this project.

The measure provides that the board shall have the power to sell bonds of the state to the extent of 5 per cent of the assessed valuation or approximately $52,944,000 at the present time. It would have the further right to issue and sell an unlimited amount of certificates of indebtedness secured by the property and revenue of specific projects. There are no provisions in the act regulating the manner in which these securities would be sold. The bonds and interest by the terms of the amendment would be direct obligations of the state. Were revenues from the operations of the board insufficient to pay interest and retirement charges on the bonds, these could be met with money from the general fund. The board could require tax levying bodies each year to levy a tax to provide funds for meeting deficits. Also the board would be authorized to sell bonds for the purpose of meeting deficits in operating and maintenance charges and for paying interest and principal on bonds already issued.

All moneys derived from the sale of bonds or certificates of indebtedness and from revenues derived from the operation of projects would be placed in a "Water and Power Fund" the moneys from which would be subject to withdrawal by the board at will.

The full text of the proposed amendment is as follows:

Section 1

It is hereby declared to be the policy and purpose of the State to conserve, develop and control the waters of the State of Oregon for the use and benefit of the people by publicly owned and operated utilities.

Section 2

The Oregon Water and Power Board, hereinafter called the "Board," is hereby established, composed of five members, who shall be elected from the state at large by a vote of the people without regard to political affiliation or nomination, and who shall be citizens of the United States and of the State of Oregon, and shall have been residents of the State of Oregon for a period of five years immediately preceding their election. Members of the board shall hold office for a period of six years, two of whom shall be elected at the general election for two successive elections and one of whom shall be elected at the general election on the sixth year, with the exception of the members of the first board who shall be Waldo Anderson, Albany, Ore.; J. T. Rorick, The Dalles, Ore.; Frank M. Gill, Dufur, Ore.; Kate Bonham, Portland, Ore., and Dan Kellaher, Portland, Ore., whose respective terms shall be determined by lot between themselves, two of whom shall hold office for two years, two for four years, and one for six years.

The members of the board named herein shall serve without pay, but shall receive their necessary expenses. Members of the board shall execute to the State of Oregon such bond as the State Bond Commission may require, the premium therefor to be paid as other expenses of the commission.

In case of vacancy on the board, the successor to such vacancy shall be chosen by the remaining member or members of the board, and such member so chosen shall hold office until the next general election or until his successor shall have been elected and qualified.

Any member or members of the board may be removed by recall as provided in the case of other elective officers of the state.

A majority of the board shall constitute a quorum for the transaction of business.

Section 3

The board shall have power:

(a) To construct or acquire by purchase, lease, condemnation, gift or other legal means, lands, water, water rights, easements, electric energy, and also to construct, complete and operate works, dams, reservoirs, canals, pipe lines, conduits, power houses, transmission lines, structures, roads, railroads, machinery and equipment, and any other property necessary or convenient for the purpose of the Article, and to do any and all things necessary or convenient for the conservation, development, storage and distribution of water, and the generation, transmission and distribution of electric energy and water for irrigation and domestic purposes: PROVIDED, HOWEVER, no plant shall be purchased for a consideration of more than five hundred thousand dollars until such purchase shall have been approved by a vote of a majority of the legal electors of the state voting at a General Election.

(b) To purchase, acquire, produce or otherwise provide facilities, materials and supplies, raw or finished, or any property or thing necessary or convenient to the accomplishment of the purpose of this Article.

(c) To supply water for irrigation or domestic purposes, or electric energy, or both, to the state, political subdivisions thereof and other users, and subject to the provisions of this Article, to prescribe the terms of contracts, and fix a price therefor and collect the same.

(d) To use the water and the lands of the state or any material therein or thereon and to require the reservation from the sale or other disposition of such land and material as in the opinion of the board will be required for the purposes of this Article.

(e) To reserve water from appropriation for such periods as it may provide.

(f) In the name of the State of Oregon to apply for and accept under the provisions of the laws of the United States, or of any state, grants, permits, licenses and privileges in the opinion of the board necessary for the accomplishment of the purposes of this Article.

(g) To co-operate and contract with political subdivisions of this state, with the United States and other states concerning the conservation and use of interstate and other waters for the generation and use of electric energy, irrigation or other purposes, in the acquisition, construction, completion, maintenance and operation of works necessary or covenient for the accomplishment of the purposes of this Article.

(h) To acquire or construct for political subdivisions distributing systems for water or electric energy bought from the state upon terms that, in the opinion of the board, will repay to the state within not to exceed thirty years the cost thereof including interest. The title to or interest of the state in such sys-

terms shall vest in the political subdivision when paid for.

(i) To sue and be sued, and to exercise in the name of the State of Oregon the power of eminent domain for the purpose of acquiring any property or the use or joint use of any property deemed by the board necessary for the purposes of this Article, said power of eminent domain to be exercised as provided under the general laws of the state.

(j) To provide itself with suitable office and field facilities and to appoint and define the duties and fix the compensation of such expert and technical officers, legal and clerical assistants, and other employes as it may require.

(k) To define projects and to adopt rules and regulations to govern their activities.

(l) To exercise all powers needful for the accomplishment of the purpose of this Article and such additional powers as may be granted by the Legislature.

Section 4

Bonds of the State of Oregon, not to exceed 5 per centum of the assessed valuation of the state may be issued and sold from time to time to carry out the purpose of this Article and the full faith and credit of the State of Oregon is hereby pledged for the payment of the principal of said bonds as the same mature, and the interest accruing thereon as the same falls due.

Section 5

Bonds herein authorized shall be issued and sold by the Oregon Water and Power Board as herein provided, and shall be serial bonds, payable in not more than fifty years from the time of issuance, and shall be in such form or forms and denomination or denominations and subject to such terms and conditions of issue, conversion, redemption, maturities, payment, and rate or rates of interest, not exceeding six per cent per annum, payable semi-annually, and time or times of payments of interest as the board from time to time, at or before the issuance thereof, may prescribe. The principal and interest thereof shall be payable in United States Gold Coin. Said bonds shall be signed by the State Treasurer and countersigned by the Governor and Secretary of State by their engraved signatures, and the Great Seal of the State of Oregon shall be impressed thereon. All coupons thereto shall be signed by the State Treasurer, by his engraved or lithographed signature. The board shall pay from funds available to it, the expenses of issuing and selling such bonds and the necessary expenses of the board in connection therewith.

Bonds herein authorized may from time to time be offered as a popular loan under such regulations prescribed by the board from time to time as will in its opinion give the people, as nearly as may be, an equal opportunity to participate therein, but the board may make allotment in full upon application for smaller amounts of bonds in advance of any date which it may set for the closing of subscriptions and may reject or reduce allotments upon applications, upon later applications and applications for larger amounts, and may reject or reduce allotments upon applications from incorporated banks and trust companies, for their own account, and make allotments in full or larger allotments to others, and may establish a graduated scale of allotments to others, and may from time to time adopt any or all of said methods, should any such action be deemed by it to be in the public interest, provided that such reduction or increase or allotments of such bonds shall be made under general rules to be prescribed by said board, and shall apply to all subscribers similarly situated. Any portion of the bonds so offered and not taken may be otherwise disposed of by the board in such manner and at such price or prices as it may determine. The board may cancel any of the bonds so offered and not taken, and re-issue them in different denominatoins.

Bonds herein authorized shall be issued and sold only for the acquisition of such property and rights, and for the acquisition, construction, development, completion, operation and maintenance of such projects as the board may deem necessary or convenient for the accomplishment of the purposes of this Article; PROVIDED, that from time to time the board shall issue and sell bonds not exceeding in the aggregate 5 per centum of the assessed valuation of the state, the proceeds of which shall be placed in the Water and Power Revolving Fund in the State Treasury, which fund is hereby created to be used by the board for the purpose of defraying its expenses, acquiring property, rights, facilities, materials and supplies, carrying charges during construction, operation of facilities, and meeting other costs incurred in carrying out the purposes of the Article; PROVIDED, further, that if at any time the revenues from projects shall be insufficient to pay the interest upon and principal of outstanding bonds, as the same shall fall due, the board, in order to avoid appropriations from the general fund and resulting taxation, may issue and sell bonds to provide funds required to make such payments of interest or principal. Except as otherwise provided in this Article, the board shall issue and sell bonds only upon the written report of the board, filed with its secretary, stating the amount of money required, the purpose for which it is to be used, and accompanied by a duly authorized certificate of the board, describing the property or rights to be acquired or the project proposed, and stating the estimated cost thereof, and showing the same to have been investigated and approved by the board, and in the case of a project, that plans and estimates therefor, a copy of which shall be annexed to such certificate, have been prepared and adopted by the board, and further certifying that in the opinion of the board, the revenue from the property or rights to be acquired or from the proposed project, together with the revenue available from other projects will be sufficient to pay within thirty years in addition to other necessary expenses, the principal and interest of the bonds to be issued.

Section 7

The board is hereby granted power to issue and sell interest bearing public utility certificates for the construction or acquisition by purchase, condemnation or otherwise, of any public utility authorized under this amendment. The certificate shall be secured by a mortgage or mortgages upon such public utility plant and the revenues derived therefrom, but shall not be a general obligation of the state and shall be paid solely from the plant or the sale thereof.

Section 8

The board shall establish such rates for service as in its judgment will provide, in addition to the expenses of operation, maintenance, depreciation, insurance and reserve for losses, funds to pay the principal and interest of all bonds issued under this Article, as the same may fall due, together with all sums which may be advanced from the general fund and interest thereon as herein provided.

Each project, as the same may be defined by the board, shall be charged by the board with its cost, which shall include its proper share as fixed by the board of all expenditures from the Water and Power Revolving Fund, and the shares so charged shall be credited to such revolving fund which shall be replenished, to the extent of the amount so credited, from the proceeds of bonds sold to provide funds for the cost of such project. The board shall establish such rates for the service furnished by each project as in its judgment will pay, within fifty years, such cost thereof, and the expenses of operation, maintenance, depreciation, interest, insurance and reserve for losses; provided, that where the rates are intended to provide for the repayment of expenditures made in acquiring or constructing distributing systems for political subdivisions, they shall be so fixed as in the judgment of the board will repay the amount of such expenditures with interest within thirty years. The board may change rates when in its opinion advisable to meet changed conditions, and shall always keep its rates as near the amount required to pay such costs and expenses as practicable, and shall fix similar rates under substantially similar conditions.

Section 9

All revenues of the board, including proceeds from the sale of bonds, shall be paid into the State Treasury and shall be applied first, to payment of the expenses of the board, cost of operation, maintenance, depreciation, insurance, and losses, and second, to the payment of interest on the principal of said bonds, and shall only be paid out as other moneys on vouchers or in the manner as other state moneys are paid out by the State Treasurer.

If at any time the moneys in the State Treasury applicable to the payment of interest or principal of said bonds, shall be insufficient to pay the same as it falls due, moneys shall be temporarily advanced from the general fund for that purpose, and there is hereby appropriated from the general fund in the State Treasury such sums annually as will be necessary to pay such interest and principal, and there shall be collected each year in the same manner and at the same time as other state revenue is collected, such sums in addition to the other revenue of the state as shall be required to pay the sums appropriated for payment of interest and principal as herein provided, and it is hereby made the duty of all officers charged by law with any duty with regard to the levy and collection of said revenue to do and perform each and every act which shall be necessary to collect such additional sum.

All moneys paid from the general fund in the State Treasury for principal of or interest on such bonds shall be returned into said general fund out of the revenue of the board as soon as the same become available, together with interest thereon from the several dates of such advances until so returned at the rate of six per cent per annum.

Section 10

Out of any money in the State Treasury not otherwise appropriated, the sum of two hundred fifty thousand dollars is hereby appropriated to be credited to the board and an equivalent amount shall be returned into the general fund in the State Treasury, out of the first moneys available in the Water and Power Revolving Fund.

Section 11

The board may establish such funds in the State Treasury as in its judgment may be required to carry out the purposes of this Article.

The board shall keep full and particular account and record of all their proceedings under this Article, and shall transmit to the Governor annually a report thereof, not less than one thousand copies of which shall be printed by the State Printer and shall be, by the Governor, laid before the Legislature, biennially, and all books and papers pertaining to the matters provided for in this Article shall at all times be opened during business hours to the inspection of any officer or citizen of the state. All accounts of receipts and disbursements shall be audited annually in the same manner that the accounts of the State Treasurer are audited.

Section 12

The state and political subdivision shall have a preferred right to water and electric energy controlled by the board as against privately owned public utilities selling water or electric energy to the public, and no contract or act of the board shall interfere with such preferred right.

The board shall not supply water to a privately owned public utility for the production of electric energy and shall not supply directly or indirectly to privately owned public utilities which sell electric energy or water to the public more than 20 per cent to the total amount of electric energy or water under its control and contracts therefor shall contain the rates to be charged the consumer and shall not extend over a longer period than five years, or to be renewed before one year prior to their expiration. Before making or renewing such a contract, the board shall publish a notice of its intention so to do, at least six days each week for a period of sixty days in at least one newspaper published and circulated in this state, and designated by order of the board for that purpose. Public utilities taking such contracts shall be required to provide the board with standby service at reasonable rates.

Section 13

Nothing contained in this Article shall prevent any political subdivision itself, or in co-operation with other political subdivisions, from developing any water or electric energy owned or controlled by it; but plans for any such development hereafter proposed shall be submitted to the board for suggestions and criticisms, so that the co-operation of the board may be secured, if practicable, for the fullest development of the proposed project. The board may acquire and develop any such project unless the political subdivision claiming the same shall have adopted plans and estimates for the development, and authorized bond to cover the cost thereof, or shall do so, within two years after the board shall have notified such political subdivision of its readiness to proceed with such development.

Section 14

In any proceeding in eminent domain brought by the board under the provisions hereof, the determination of the board that the taking of the property described in the complaint is necessary for the purposes hereof shall be conclusive evidence of such necessity.

In any such proceeding the state may take immediate possession and use of any property required for the purpose of this Article, by paying into court such amount of money as the court, upon five days' notice to the adverse party, may determine as reasonably adequate to secure to the owner of the property sought to be taken immediate payment of just compensation for such taking and any damages incident thereto.

Section 15

All public officers, boards, commissioners and agencies shall make available to the board all data and information in their possession required by the board, and shall render every assistance in their power in carrying out the provisions of this Article.

Section 16

The term "political subdivision" as used in this Article is hereby defined to mean and include any state, county, city, town, public board, public corporation or quasi public corporation, water district, irrigation district, municipal corporation, having authority to contract for the purchase, sale or use of water, water power, or electric energy, but shall not be construed to include any privately owned public utility.

Rural Electrification from an Economic and Engineering Standpoint---II

Extension Policies and Rate Derivation

By L. S. Wing*

Engineer, California Farm Bureau Federation, San Francisco

A REVIEW of rural extension policies which have been in effect during the past shows that the ideas of the utility managements have been quite as individual and varied as in the case of rural rate schedules, and on the whole quite as unsatisfactory. Not until 1924 was there an extension policy in effect in California which was satisfactory to both the utility and the consumer.

The first extensions were built without any well defined rules. The company built into any territory which looked profitable. Soon, though, consumers beyond desired services and this was rendered if the consumer put up the entire amount of the cost of line construction. Money so advanced was sometimes refunded on the basis of 50 per cent to as low as 10 per cent of the bills for electricity used. Some rules provided refunds also for additional business at the rate of so many dollars for each kind of business added. Later the rules became more liberal and the companies agreed to spend twice the estimated annual revenue; the difference between this amount and the estimated, or final cost of the line, was to be advanced by the consumer. This rule was later still further liberalized to a ratio of three to one, and one large company now extends its lines spending five dollars in distribution lines, transformers, meters, etc., for each dollar of estimated revenue from the extension.

The advances made for lines under these old rules were usually refundable on two bases: First, for new business added which required no additional investment by the company except for service and meter, $50 for each lighting range or water heater service, and $10 for each horsepower of motor load. Second, 20 per cent of the monthly bills for service received.

Extensions were also made without any advance if the farmer would build a sufficient amount of the line to bring the balance within the free limits of the rule, or if he would guarantee an annual revenue over a three-year period equal to the cost of the extension. Practically all contracts were for three years initial service, and no refunds were made after the tenth year. These old extension contracts gave rise to many complaints of which the following are representative:

1. Consumers believed the company's estimates, or actual cost of building the line, were too high.

2. Consumers expected a refund as soon as new business came on to the line, but seldom received it because additional construction was usually required.

3. Where consumer guaranteed more than his requirement under the three-year guarantee plan, he wasted energy and was dissatisfied because he paid for something he couldn't beneficially use.

4. In some cases lines were financed by selling stock of the utility to the prospective consumers; this practice led to considerable complaint and was abandoned several years ago.

Under the above mentioned rules the company was obliged to make quite detailed estimates of many extensions which were never built. If the extension were made, and it required an advance, the consumer often complained of the efficiency of the company's construction crews, and many cases were referred to the state commission for investigation and adjustment. The most dissatisfaction arose from those parties who financed a line where one of their neighbors refused to aid, who, when the line had been constructed, would apply for service and often get it free or with a much smaller advance than was made by the others. The parties to the original extension felt that they were entitled to be recouped in part for the advance made by them, and looked to the company for a refund. This under the rules prevalent was usually impossible.

In 1924 as a result of the combined efforts of the State Railroad Commission and the California Farm Bureau Federation, one utility put into effect a new type of extension rule. This type has met with so great success that most of the companies operating in rural territory have adopted it. It provides that the company shall furnish all transformers, services and meters, and construct in addition the following amounts of distribution lines free:

For each lighting consumer	100 feet
For each kw. of connected load of heating or cooking	75 "
For each refrigerator installation	100 "
For each hp. of power load (less than 5 hp.)	75 "
For each hp. of power load (5 hp. or over)	100 "

For extensions beyond the free length the consumer advances 25 cents per foot.

A contract for an initial period of three years is required and refunds are made as follows up to the tenth year for ALL new business connected to the extensions:

For a new lighting consumer	$25
For each kw. of additional cooking and heating load	6
For each additional hp. of power load	10

In addition to the above, 10 per cent of the consumer's power bills are refunded annually.

* Extract from a paper before the annual convention of the American Society of Agricultural Engineers, Lake Tahoe, Calif., June 23-26, 1926. Part I appeared in the Sept. 1 issue of the Journal of Electricity.

This form of extension rule is equally popular with the utility and the consumer. It is simple and easily applied. The consumer can check the distances and, therefore, knows whether he is being fairly treated. Refunds are made for all new business which the extension has made possible; additional refunds based on consumer's bills encourage greater use. The companies like it because it has reduced extension complaints to a negligible quantity and also has done away with useless extension estimates.

An extension contract is presumed to represent a meeting of minds, a common understanding, and should be short and simply stated, for when couched in legal phraseology and filled with technical terms of which the farmer knows little or nothing, it is valueless. Usually then the farmer's understanding of the matter is entirely gained from the company's solicitor and is often wrong.

The chief requirements of an extension contract are:

1. It should be short, simple, and easily understood.
2. The company's investment should be based on factors readily understood by the consumer and within his control; namely, the amount of company's expenditure should depend upon the size and character of consumer's installation.
3. The guarantee to take service should not extend beyond a five-year period.
4. It should contain a statement that the rates charged are subject to change at the discretion of the regulatory body.
5. Refunds should be made on the basis of ALL business added to the line; also a certain per cent of consumer's bills should be refunded.

The rate for power, and the extension rule are closely allied, one being derived from the other, but in presenting them to the farmer they should be kept entirely separate. Every farmer should be on the same rate schedule regardless of any advance required by him to get service, or investment made by the company. He will likely forget any different amount advanced to get service than did his neighbor, but if made part of the rate, it is a perpetual reminder and he is apt to become dissatisfied.

The policy of utilities of selling utilization equipment to consumers is a good one; it is helpful in obtaining high load factor conditions from the start.

Allocation of Costs and Derivation of Rates

The law under which public utilities operate holds that they are entitled to a fair return upon the reasonable investment in properties used and useful in serving the public. This return is computed from the net revenue available after paying all operating expenses, taxes, and accrued depreciation. What constitutes a fair return cannot be definitely stated from court decisions. However, where an electric utility is developed and serving a dependable load, 8 per cent has come to be looked upon as fair for small and moderate sized companies, and 7½ per cent return for the larger ones. During the years when it is necessary to pioneer the business as a whole or of a class, if a company earns sufficient net after operating expenses to pay the interest on the securities sold to finance the undertaking, it would be deemed extremely fortunate.

Depreciation is another subject concerning which there has been much discussion. Where rates are based on undepreciated values, the sinking fund method is generally used. In applying depreciation rates, it should be remembered that lives of equipment in rural districts are longer than in congested urban sections. In this state an allowance of 2 per cent for all rural equipment is ample. Maintenance of distribution lines exclusive of transformers, services and meters averages about $50 per mile.

Rate making is not an exact science; it is an art. It involves determining the price which may be charged each class so that the total amount of service rendered will be the maximum and at the same time keep the utility financially sound. Accountants and rate experts have endeavored for years to devise some method upon which cost allocations to classes of service might be accurately predicated. All methods so far suggested fail to take into account the economic requirements of the classes served. It is true that such factors have nothing to do with the cost to the utility of serving them, yet it is equally true that rates must recognize the ability of the consumer to pay a certain maximum revenue or else he will not take the service.

Costs Incurred by Utility

Arbitrary cost allocations to classes are for the most part futile. The cost incurred by the utility is to a great extent that in connection with serving all classes. This cost must be viewed in its entirety and compared with the total revenue which can be obtained in serving the entire load. All attempts to break it down into component parts are based upon arbitrary combinations of facts. Under most methods of allocation the classes such as lighting must carry more than their ratable shares of fixed charges and general expense, while heating and such applications will not be able to pay much more than the bare additional cost of serving them. If no rate is below marginal cost and all classes are contributing something to the portion of the expenses which is not definitely assignable to any one class, in accordance with their ability to pay as measured by costs of substitutional forms of energy, then the rates are fair and equitable. The existing spread of rates has been based primarily on the above considerations with beneficial results to the communities served. An arbitrary spread of rates in accordance with theories so far advanced would often result in rate re-adjustment which, if made effective, would cause many companies to lose a great portion of their present business, which in turn would increase the existing rates to the very classes that, according to the theory of their proponents, are entitled to a reduction.

While the maximum peak of the year does not determine the company's total installed capacity, this investment, however, is not made for the loads served at the time of this peak alone, but for the entire business of the utility. Individual peaks also measure the cost of serving separately, by electricity, a class of consumers—but not the cost of substitutional service. Load factors of classes are helpful in determining the portion of the equipment used, but do not measure social needs.

The history of rates discloses the fact that every class of load and each consumer has not been equally profitable to the company. The company cannot economically charge more than the traffic will bear, and should not serve any class of consumers at less than marginal, or out-of-pocket cost. Between these two limits every rate should lie.

Because of the pioneering nature of rural electrification, rural consumers will not be able to pay more than the out-of-pocket costs of service for several years. There are, though, many instances where this load can be served without a loss to the utility or its other consumers, yet at rates which the farmer can afford to pay.

A study of the load curves of various utilities throughout the United States shows marked similarity in most of them. In general the annual peak of the system load occurs on a day in winter at about 5:30 p.m. This typical daily load curve for each season and for the annual peak is shown by Fig. 6, taken from a super-power survey made by the United States government in 1919.

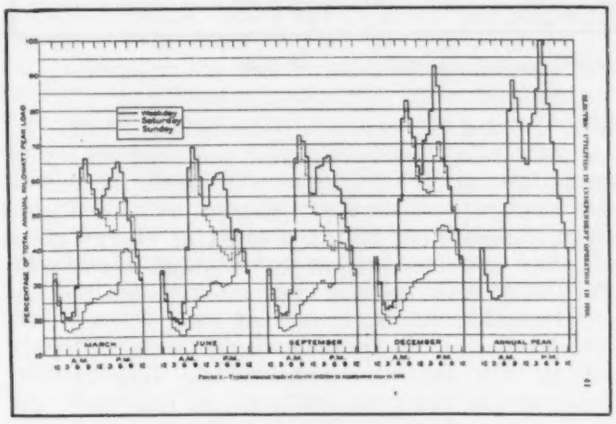


Fig. 6. Typical system seasonal and peak load curves.

In order to see what effect the agricultural load will have upon a utility's load curve it will be necessary to know the possible and probable use to which it will be applied on the farm which it serves. The domestic uses are quite well developed, and will be similar to those in urban communities, but greater use will be made on the farm of ranges, refrigerators and other such power consuming devices. An annual use at this time of 3,500 kw-hr. for domestic purposes can be beneficially made by many farmers. The farmer's chief labor and power applications occur between May and October, a load at present "off-peak" for the majority of utilities.

The amount of water which will be used in agriculture cannot be predicted, but the power load should be very desirable in that it will fill the summer valley in the annual load curve without additional investment in production and transmission equipment. This is illustrated by Fig. 2 in the preceding article. (Journal of Electricity, Sept. 1, p. 162.)

In designing a rate schedule, it is essential that each consumer pay the costs which he directly incurs due to the fact that he is connected to the power system, regardless of the amounts of energy which he uses. These are given in Group "A" in Fig. 7. Starting at the consumer's end of the system, the cost of rural service may be set up as follows:

Direct Costs Chargeable to Each Consumer

Group "A"—Entire amount charged against each consumer

1. Interest, depreciation, maintenance and operation expense on transformers, meters and service used in serving consumer.
2. Core losses in transformer, and meter shunt coil losses in equipment used to serve consumer.
3. Cost of meter reading, billing and collecting.
4. Portion of general expense and taxes applicable to above fixed charges and operating expenses.

Group "B" and "C"—Joint costs—in part chargeable directly and in part allocable to each consumer

1. Interest, depreciation and maintenance and operating expenses on distribution lines, substations and transmission lines.
2. Interest, depreciation and maintenance and operating expenses on distribution lines, substations and transmission lines. Allocated on some arbitrary basis.
3. Portion of general expense and taxes applicable to above fixed charges and operating expenses. Chargeable directly to consumer on kw-hr. basis.

Group "D"—Chargeable directly on a kw-hr. basis

1. Remaining costs of producing energy at generating point including transmission and distribution losses entailed in supplying consumer plus a portion of general expense and taxes.

Note: Interest should not be charged on property built with advance received from consumers.

Fig. 7 shows how these charges are incorporated in a rate schedule so that each consumer will pay the proper amount. The rate schedule if properly designed will collect from each consumer all of the charges under Group "A" and some portion of those under Group "B," even when the consumer's use is negligible. The total amount of the charges included in Group "B" and "C" which the consumer should pay will depend upon his total use, load factor and the class of service which he is taking.

All of the charges in Group "A" can be readily computed. The allocation of fixed charges and constant operating expenses, those costs which are incurred in providing and maintaining a plant capable of generating, transmitting and distributing electricity, are difficult to allocate to a particular class, or to different sizes of installations within the same class. In allocating distribution fixed costs chargeable against distribution lines, the diversity in each group of sizes into which the schedule is divided should be considered separately, viz: 1—4 hp.; 5—14 hp.; 15—49 hp., etc. The greater the diversity within a group, the less the fixed costs in Group

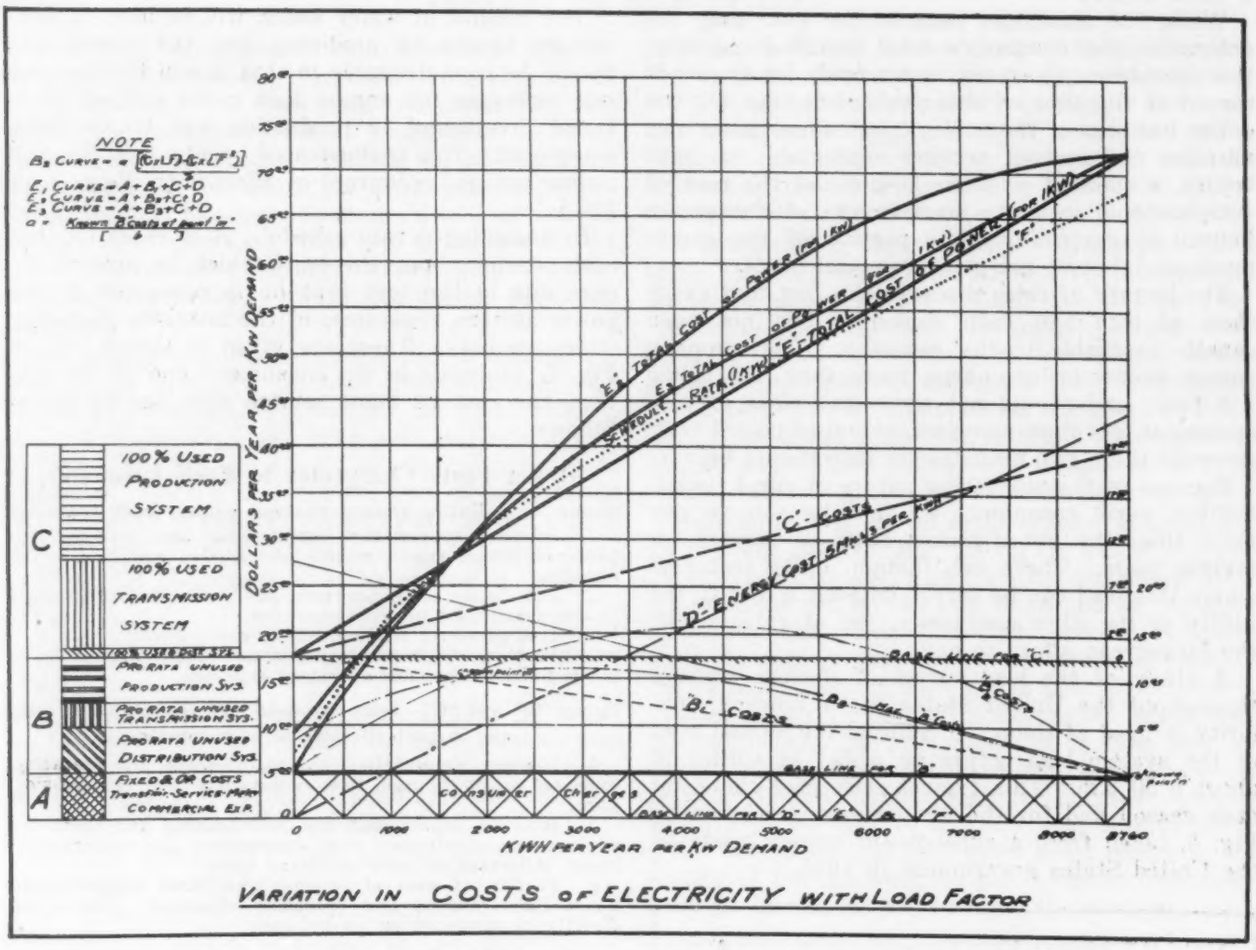


Fig. 7. Curves showing derivation of rural rate and proper allocation of costs.

"B" will be per unit of connected load or individual maximum demand. Although the maximum possible diversity within a group is the reciprocal of its load factor, in practice it will actually lie between unity (or no diversity) and this maximum. In practice it has also been proved that with two groups of loads of the same character having the same total connected load and load factor, the group having the greater number of installations will have the greater diversity. In other words, 20 5-hp. motors will have a smaller simultaneous demand than 10 10-hp. motors using the same amount of energy, for the same general purpose. Small motors, then, should not be charged as great a portion of distribution, transmission and production fixed costs in Group "B," per hp. of their individual maximum demands, as the larger sized motors in the same group. Offsetting this is the fact that large sized motors tend towards greater density per unit of distribution line length. This gain in density is not always real, for the large sized agricultural motors are usually installed in connection with large farms, and analysis has shown that the horsepower installed per acre is apt to be less for large motors than for the small sizes.

Reference to Fig. 7 will show that the costs of producing, transmitting and distributing energy have been segregated into three groups: "A," "B" and "C," and "D" previously mentioned; Group "B" and "C" being subdivisions of the same group of costs. Group "A" charges are the costs incident to the consumer's individual installation and should be paid regardless of the amount of energy used, as they are independent of kilowatt-hours sold. They vary with the size of the installation but not in proportion to the connected load. Group "D" costs comprise the operating expenses which vary directly with the kilowatt-hours sold, such as fuel; these are indicated by the straight line "D." The remaining costs are fixed and are determined largely by the capacity of the plant; these are indicated by the groups "B" and "C."

Group "C" expenses are computed on the basis that the production, transmission and distribution systems are operated at 100 per cent load factor. This cost is derived by dividing the total costs chargeable to a class other than "A" and "D" expenses, for each part of the system involved by the maximum simultaneous demand at consumer's meters at the time of the system peak. This results in a cost per kilowatt for a 100 per cent load factor consumer; the amount chargeable against any particular consumer is then proportional to his load factor. These are indicated by the line "C."

Since the average load factor of any class is always less than 100 per cent, there will remain a

certain portion of these fixed costs (equal in per cent to one minus the weighted average load factor of the class) which will not be chargeable under "C." This portion of the production, transmission and distribution fixed expenses is termed the unused capacity costs and is indicated by Group "B." These remaining expenses are extremely difficult to allocate to installations operating at different load factors. In practice the actual costs per kilowatt are known for only the two points indicated on the "B" curves at "M" and "N." These two points are respectively at 100 per cent load factor and the weighted average load factor of the class. At 100 per cent load factor "B" costs or unused capacity costs become zero. At the weighted average load factor they are equal to the difference between the total fixed capacity costs and that portion of them which has been collected on the load factor basis "C," divided by the total individual demands of the class.

In order to determine the cost at other points one method would be to draw a straight line through these two points, such as "B_1". This yields a total cost of service corresponding to the straight line "E_1". This arbitrary "solution" of the problem in my opinion, is incorrect. The amount of the "B" charges per kilowatt of individual demand depends entirely upon the diversity of the load. Theoretically, diversity varies as the reciprocal of the load factor and would, therefore, be infinite at zero load factor, and unity at 100 per cent load factor, yielding a hyperbolic form of curve. The unused capacity costs vary as a straight line from a maximum at zero load factor to zero at 100 per cent load factor. These costs divided by the diversity at each corresponding load factor yield a curve similar to "B_2", but of lesser magnitude, the values having been increased in order to make the curve pass through the known point "M." The "B_2" curve results in the total cost curve "E_2". This solution of the problem is also incorrect since it charges the high load factor consumer with excessively high capacity costs. Since the total capacity costs at any load factor should not exceed those at 100 per cent, another line "B_3", has been arbitrarily drawn which keeps below the maximum "B" line at all points, and yet has the same general trend as the "B_2" curve. This line more nearly represents the "B" costs assessable at each load factor than does the straight line "B_1", since it takes into account the variation in diversity at different load factors. It gives a total cost curve "E_3". The application of this to commercial practice is illustrated by the schedule rate curve "F." The rate shown is blocked on the annual basis similar to the schedule shown in Fig. 4 in the preceding article.

Much has been said in regard to the charges which properly comprise a rural rate, but two things usually overlooked are the correct treatment of consumer's advances and the relationship which exists between the rate for service and the extension rule. The reason for the consumer making the advance is in order that rates may be maintained at the existing level, which is possible only if the same average investment in distribution lines is maintained. Obviously, if the entire cost of the extra long extensions were included, it would defeat the very purpose of the advance and the consumers would be compelled to pay interest on the moneys they had loaned the utility. The other element often overlooked in making rural rates is the interdependency of the rate schedule and the extension rule. If the consumer paid for all rural distribution lines, transformers, meters, etc., he would be entitled to get power at the cost delivered from substation plus only line losses and the cost of maintaining the rural lines. On the other hand, if the company alone finances rural extensions, then the rate for energy delivered must be much higher. The average rate per kw-hr., therefore, depends upon the company's distribution investment per consumer, or per kilowatt of connected load, as well as upon other factors already mentioned. The amount of such distribution investment to be carried by the company will be arbitrarily determined but will depend upon the number of consumers per mile, the character of the load available, a consideration of the average consumer's ability to help finance the line, and the possible future development of business.

If the consumer's advance is large, then the rate will be comparatively low and future growth in business may not be sufficiently profitable to the company to warrant a refund of the advance; in other words, the cost of the new business taken on may equal the amount the company can afford to spend under the rates, leaving nothing available for refunds. This condition is unfair to the parties who have made the initial advance in that the company eventually owns the line and usually gets a return upon it although it has nothing invested.

The other extreme is for the company to finance the entire line. This may require a higher rate than that under which business will readily develop. It stifles heavy use, which is absolutely essential to rural line development. Some economic medium must, therefore, be taken between the two limits.

In connection with the extension rule, one more factor should be pointed out. After the company has determined the investment which it feels it should make on the average for each lighting, cooking, water heating, or refrigerator consumer, careful consideration should be given to the number of each of these installations which will be served from the lines, which will cost the company less than the average investment. The extension rule should provide terms liberal enough so that the installations served free which cost the company more than the average amount of the company's rural investment will be offset by those which are below the average. Rural villages should be considered as part of the rural load in determining rates and extension rules.

If this paper has shown to some extent that the factors which govern rural electrification are largely economic considerations, not susceptible of accurate mathematical analysis, and if it proves helpful in solving these problems, it will have served its purpose.

CENTRAL STATION CONSTRUCTION OPERATION AND MAINTENANCE

Use of "Grounding Banks" Protects Delta Circuits

Auxiliary Bank of Transformers Gives Adequate Protection for Feeders Supplied From Delta Transformers

By L. F. HUNT, Development Engineer, Southern California Edison Company, Los Angeles

In substations where the 10- and 15-kv. circuits are fed from a delta transformer a grounding bank can be installed to furnish short-circuit current for tripping the circuits should they become grounded. This method of tripping of faulty feeders has been recommended for use in some substations on the Edison system. R. E. Cunningham of the Southern California Edison Company has added a very interesting and important feature to the above scheme.

In this method the grounding bank should be large enough to produce sufficient short-circuit current to blow fuses of the customers' transformers when grounds occur. Approximately nine-tenths of the trouble on circuit is caused by customers' faulty apparatus. Thus, if the fuses of the customers' faulty transformers blow the trouble is isolated and does not involve the whole circuit. However, in the case a line happens to fall down and the grounding bank does not produce sufficient ground current to kick out the feeder switch from overload, a means must be provided to trip the switch cut from ground current or overload protection installed on the grounding transformer. An automatic switch could be installed sa as to open up the closed delta, this switch operated by an overload relay that has sufficient time element to allow for the clearance of any outside trouble. In this case methods must be used to pick out the feeder in trouble and then to drop it until the trouble is cleared up.

However, in the case of using a residual relay the circuit that has sustained trouble will be cut out automatically. Using the residual relay scheme of Roy Wilkins of the Pacific Gas and Electric Company, a scheme has been worked out as shown in Fig. 1. This scheme shows the use of a grounding bank and residual relays. The grounding bank also can be used for ground detection. If the secondary voltage of the grounding bank is above the 63.5 volts, which is normal for the ground detector, a potential transformer may be used to reduce the potential to the desired value. The knife switch or oil switch is used to take readings on the ground detector. In cases of slight grounds a reading on the ground detector would indicate such conditions. The current transformer used in the closed delta would have its ratio in keeping with the current desired for the residual relay operation.

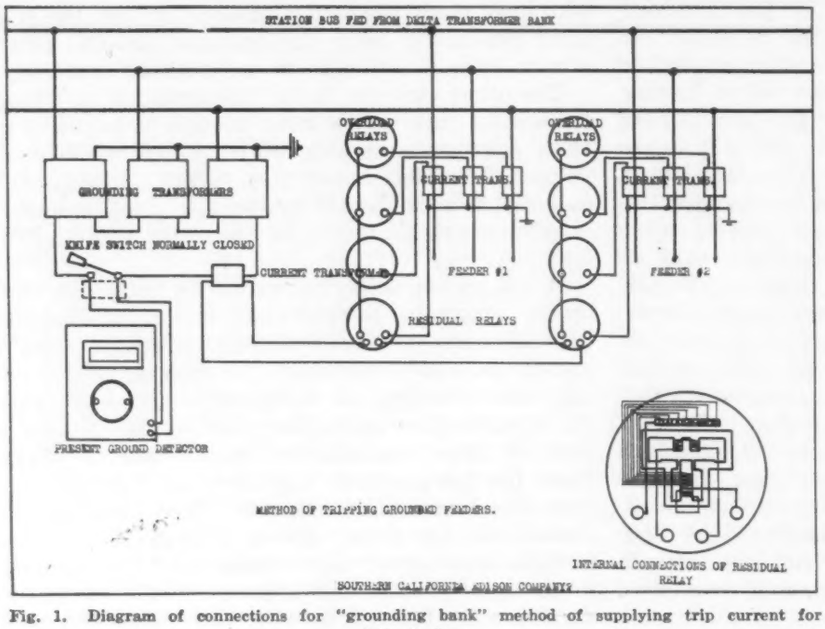


Fig. 1. Diagram of connections for "grounding bank" method of supplying trip current for delta feeders.

The residual relay is made from a Westinghouse type CO low-energy overload relay. The change of connections is shown in the insert, Fig. 1. The three characteristic curves give the functioning of this residual relay. See Fig. 2.

Theories regarding the amount of short-circuit current available from a grounding bank disagree. Therefore, a set-up of an actual grounding bank was made and tests made to ascertain the proper theory. From these tests the short-circuit current in the line phase-wire going out to the trouble is determined as follows:

$$\frac{\text{Kva.} \times 100}{E \times \sqrt{3} \times \%Z}$$

Kva. = Total capacity of grounding bank.

E = Bus voltage.

%Z = Impedance of grounding bank plus impedance of line involved.

The current in the closed delta of the grounding bank will be ⅓ of the above current times inverse ratio of the turn ratio of the transformers.

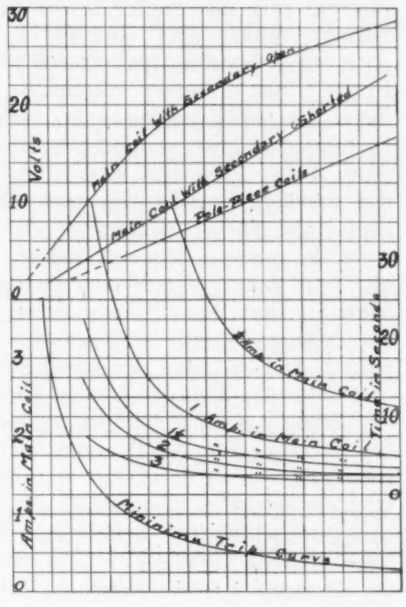


Fig. 2. Characteristic curves of residual relay.

A diagram of schematic connections of the grounding transformer, station transformer and feeder is shown in Fig. 3. The short-circuit current magnitude and direction are indicated by the arrows for the assumed case of C-phase grounded. Transformer C is shorted due to the ground, but trans-

formers A and B still are energized, causing the effective voltage to be produced across transformer C. Thus this voltage produces short circuit current in C. The three transformers being closed delta give the equivalent of three transformers in series. Consequently transformers A and B have the same magnitude of current as in C. This current in the primary then is obtained from the station transformer bank in phase A and B. However, the three currents, due to being in the same phase relation, add up on the phase-wire of the feeder in trouble.

Tpyical Example

With the above information the size of grounding bank necessary for a given installation easily is calculated. It is desired to have a grounding transformer that will be capable of delivering sufficient short-circuit current to blow a customer's fuse at the end of the longest feeder on that particular bus. The customer's transformers generally are fused with from 5 to 25-amp. fuses. In order to have fuses blow, approximately 75 amp. should be produced by the grounding transformer. For example assume a circuit from Katella substation where the kva. necessary to produce 75 amp. at the end of the 11-kv. line will be as shown in the calculation below.

The approximate impedance of the 11-kv. line is about 0.755 ohm per mile. Assuming 10 miles as the longest line from Ketella:

$$I_s = \frac{\text{kva.} \times 100}{11\text{ kv.} \times \sqrt{3}\ \%Z.}$$

$$\%Z = \sqrt{\left(\frac{\%X_M + \text{kva.} \times X_H}{(\text{kv.})^2 \times 10}\right)^2 + \left(\frac{\%R_M + \text{kva.} \times R_H}{(\text{kv.})^2 \times 10}\right)^2}$$ Exact

$$\%Z = \%\,Z_M + \frac{\text{kva.} \times Z_H}{(\text{kv.})^2 \times 10}$$

approximate. Where
Z_M of transformers to be used is approximately 4.0, therefore

$$\%Z = 4.0 + \frac{\text{kva.} \times 7.55}{121 \times 10}$$ and therefore

$$I_s = 75 = \frac{\text{kva. x } 100}{11 \times \sqrt{3}\ \left(\frac{4.0 + \text{kva.} \times 7.75}{1{,}210}\right)}$$

$$75 = \frac{\text{kva. x } 100}{\frac{11 \times \sqrt{3}\ (4840 + \text{kva.} \times 7.75)}{1{,}210}}$$

$$75 = \frac{\text{kva. } 121{,}000}{92{,}100 + 147\text{ kva.}}$$

$$121{,}000\text{ kva.} - 11{,}000\text{ kva.} = 6{,}900{,}000$$
$$110{,}000\text{ kva.} = 6{,}900{,}000$$
$$\text{kva.} = 62.5$$

TO CHECK:

$$I_s = \frac{62.5 \times 100}{11 \times \sqrt{3}\ \left(\frac{4 + 62.5 \times 7.75}{1{,}210}\right)}$$

$$= \frac{62.5 \times 100}{19.\ (4 + 0.4)}$$
$$= 74.8$$

Where:
$\%\,Z = \%$ Total impedance
$\%Z_M = \%$ Transformer impedance
$\%Z_H = \%$ Line impedance
$I_s =$ Short-circuit current
$I_H =$ Current in delta of grounding bank

According to the above calculations the size of transformers to be used should be three 25-kva. transformers.

If three 25-kva. transformers were used, plenty of current would be produced to blow fuses in cases of ground trouble.

$$I_s = \frac{75 \times 100}{11 \times \sqrt{3}\ \left(\frac{4 + 75 \times 7.75}{1{,}210}\right)}$$

$$= 88\text{ amp.}$$

Assuming a ratio of 11,000 to 440 volts:

$$I_H = \frac{11{,}000 \text{ x } 88}{440 \quad 3} = 734\text{ amp.}$$

Using a current-transformer ratio of 200/5 to excite residual relays as shown in Fig. 3, 18.3 amp. will flow through the residual relay pole-piece windings.

The circuit current-transformer ratio is 200/5. Therefore, 88 amp. ground current would give 2.2 amp. through the other winding of the relay. From the minimum-trip curve (Fig. 3) of this relay, using 2.2 amp. in the main coil, it will require but 0.7 amp. in the pole-piece winding to trip and the current available is 18.3 amp. This gives 26 times minimum-trip value. Therefore, grounds less severe than 100 per cent will produce sufficient current to operate the residual relay.

In the event that the residual relay is not desired an overload relay could be used across the current transformer connected in the delta of the grounding-transformer bank. Full-load current of the 25-kva. transformers on the low side is 57 amp. Therefore, the current transformer ratio would need to be 100/5 and the overload relay should be set on the 4-amp. tap with a long time setting. This relay should operate a switch that will open up the delta on the low side, relieving the bank of short-circuit current.

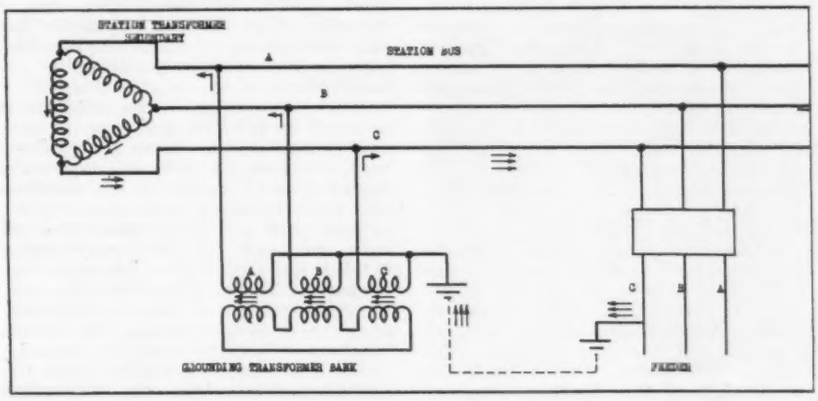


Fig. 3. Schematic diagram of connections for grounding transformer bank.

Operating Data on Creosoted Pine Poles

By H. E. BRAUNIG, Superintendent of Transmission and Distribution, Eastern Texas Electric Company, Beaumont, Texas

An increase in the use of creosoted pine poles throughout the entire country during the past several years has made possible a more thorough knowledge of these poles through studies accompanying this increase. The prime object of the following discussion is to present something of a summary of these recent studies. The sources of data will be found completely listed in the accompanying bibliography.

Strength

Strength is mentioned first because of its prime importance in line construction and because it is an outstanding characteristic of creosoted pine. That creosoted pine has a greater strength than other woods is borne out by the results of investigations carried on by the American Telephone & Telegraph Company, the United States Forest Products Laboratory, and the Department of Agriculture. In Bulletin 556 of the Department of Agriculture the creosoted pine is listed as being 44 per cent stronger than its nearest competitor, and this is confirmed by the others. In line construction it is possible to take advantage of this greater strength in either of two ways, smaller poles may be used or longer spans safely carried on the usual sizes of poles.

A fact of equal importance is that creosoted pine retains its strength over a long period of time. Tests, some of which have been made within the past two years, on creosoted pine poles 27 years old showed no decrease in pole strength. All evidence seems to show that as long as the wood is preserved against decay the original strength is undiminished.

A striking example of this occurred in the Beaumont, Texas., territory March 30, 1926, when a cyclone hit that vicinity and did extensive damage to all forms of structures except creosoted pine poles. On the properties of the Eastern Texas Electric Company there was much damage done, a great many wires and some 60-odd poles being broken. However, none of the creosoted poles were broken even though some of them were blown over to angles of as much as 40 deg., breaking conductors and insulators. Fig. 1 shows a section of the Beaumont-Liberty 66-kv. transmission line that was in the path of a 110-mile wind

during this storm. This line is constructed on 55-ft. creosoted pine poles.

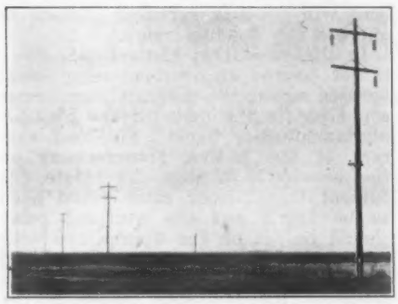


Fig. 1. Beaumont-Sour Lake 66-kv. transmission line is constructed of creosoted pine poles and successfully withstood 110-mile wind.

Life

The life of creosoted pine poles has been estimated variously at from 25 to 40 years of active service. The tendency seems to be toward the higher figure. A power line between Port Arthur and Beaumont constructed on 652 creosoted pine poles in 1912 is still in service, having had only three poles replaced in 14 years. Even the poles replaced were solid at the ground line and at the top but were decayed where they had been abraded deeply. A telephone line between Dallas and Sherman, Tex., built in 1909, on some 2,400 creosoted pine poles never has had even a single replacement. Another telephone line constructed of this type of poles in 1898 has had less than 10 per cent replacements in the 28 years ensuing.

In examining these old lines it is oustandingly apparent that the poles are about as good as they ever were. The wood is preserved by the creosote and as long as the wood remains sound there seems to be no deterioration in strength or quality. It is of interest to note that these cases deal with poles treated from 15 to 30 years ago. The art of timber treatment has advanced during these years, and there is no doubt that present-day treatments are much more efficacious than the earlier treatments and methods.

Conductivity

The conductivity of creosoted pine poles appears to be dependent upon the moisture content of the pole, the period of seasoning after treatment, and to the percentage of turpentine and rosin, if any, left in the poles when treated. It is interesting also to note that the dry, untreated pole shows about the same resistivity as does the treated pole directly after treatment. Thus it would seem to be of advantage that the poles be seasoned for a period of two months after treatment, or pass through some process producing a similar result. Consensus of opinion seems to be that creosoted poles are at least as satisfactory from a conductivity standpoint as any other pole.

Birds and Insects

White ants are a serious problem on the Gulf Coast. They are one of the most virulent wood destroyers known and once they begin work upon a pole nothing can save it from total destruction. It is not uncommon for this insect to riddle completely an untreated pole within a year's time. Experience to date has shown that creosoted poles are the only ones successful in withstanding the attacks of the Termite, or white ant, for a long period of time. This is due not to the wood itself but to the presence of creosote forced deep into the wood by the treatment process.

In this connection it is of interest to note that during the above-mentioned storm where several insect-damaged poles went down under the enormous wind pressure the damage was stopped where creosoted poles were encountered.

Woodpeckers are not numerous in many sections of the Southwest. In some places, however, they have done serious damage, weakening poles both by the removal of wood from the pole and by making pockets which hold moisture and hence promote decay. Creosote has been found to be highly resistant to these pests, too.

Fire Resistance

Irrefutable authorities state that, while freshly treated timber is more readily inflammable than untreated timber, the older treated timber is much

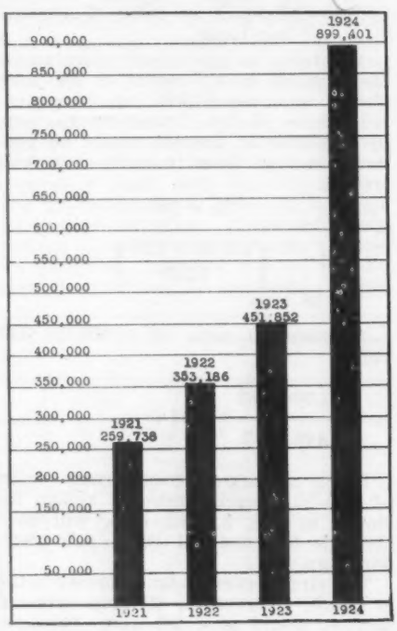


Fig. 2. Increasing use of creosoted yellow pine poles in the United States, based upon U.S. Forest Service statistics.

more fire-resistant than untreated timber. Experience and research point out that, as between treated and untreated wood, the former is less subject to fire damage. This fire-resisting quality of creosoted wood is explained upon the basis that when creosoted timber is ignited a chemical decomposition of the creosote takes place during the burning. This decomposition deposits a coating of carbon on the wood, protecting it to a certain extent.

Costs

Definite cost figures depend upon the local conditions to which any particular utility may be subject, such as freight rates, installation and labor costs, climatic conditions, and other items, all of which will vary for different companies. Hoewever, studies made by the Eastern Texas Electric Company and by the Carolina Light & Power Company show creosoted pine as having a decidedly lower annual cost than any other pole.

Bibliography

1. Tests on Pole Strength. By American Telephone & Telegraph Company, 1924. (These reports are to be published by one of the engineering societies.)
2. Results of Some Strength Tests on Wood Poles. By T. R. C. Wilson, U. S. Forest Products Laboratory, Madison, Wis.
3. Southern Pine Poles. 1923 report of Overhead Systems Committee, Pennsylvania Electric Association, Eastern Geographic Division, N.E.L.A.
4. Characteristic and Cost Data. April 1, 1925. By Distribution Department, Carolina Light & Power Company.
5. Report of Inspection of Preservative Treatment, Dallas-Sherman Toll Pole Line, 1921. Southwestern Bell Telephone Company, Dallas, Texas.
6. Wood Preserving News, September, 1925.
7. Report of Conductivity Committee. In Proceedings of American Wood Preservers Association. 1923. Pages 362-3.
8. Tests of Methods of Protecting Woods Against Termites or White Ants. U. S. Department of Agriculture Bulletin No. 1231. By Thomas E. Snyder.
9. The Fire Hazard of Treated Timber. Proceedings of American Railway Bridge and Builders' Association. October, 1924. Pages 152-3.
10. The Creosoting Industry with Relation to the Fire Hazard. Quarterly of the National Fire Protection Association. April, 1918. Pages 399-413.
11. Quantity of Wood Treated and Preservative Used in the United States in 1923. IBID 1924. Published by R. K. Helphenstine, U. S. Forest Service, in co-operation with American Wood Preservers Association.
12. Report on the Stability of Concrete Poles for Use by Light, Power and Street Railway Companies. By C. V. Merriam, Eastern Texas Electric Company, Beaumont, Texas.

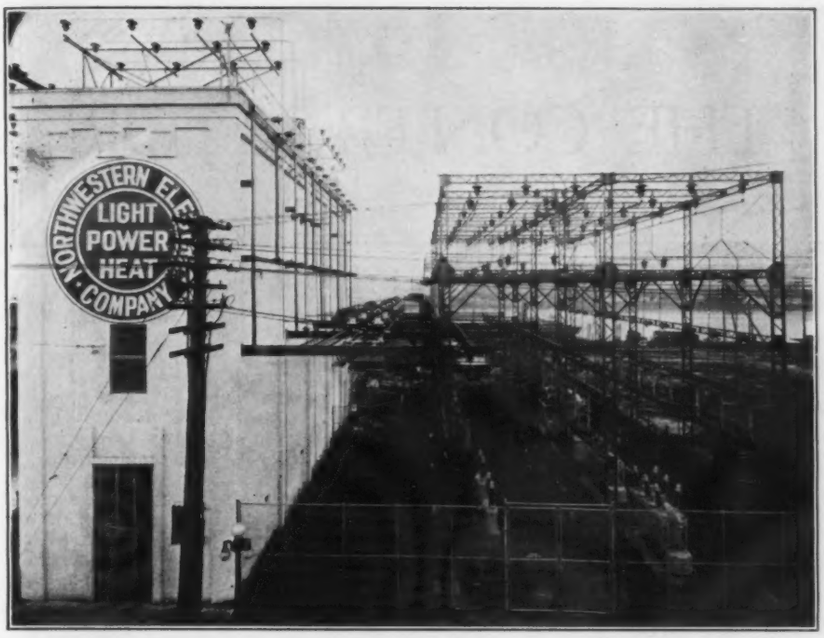
New Transmission Switching Center Established

By E. F. PEARSON, Electrical Engineer, Northwestern Electric Company, Portland.

The new high-tension steel bus structure at the Albina substation of the Northwestern Electric Company, Portland, was installed to concentrate the control of the power sources of the company in the interest of greater flexibility. Three 66-kv. lines now converge at this station—the 70-mile transmission line from the Condit hydro plant on the White Salmon River, the tie line to the company's Lincoln Street steam plant in Portland, and the tie line to the Knott Street substation of the Portland Electric Power Company to effect a connection with the system of that company. Each of these lines has a capacity of 30,000 kw. A double bus and a single set of oil circuit breakers provide the necessary flexibility of switching.

A fourth position on the structure is occupied by a 66-kv. lead into the substation building to serve a step-down bank of transformers, of 12,000-kw. capacity, serving the 11-kv. distribution lines radiating from this station.

Main and auxiliary buses and all runs and leads are of copper tubing carried on O-B 73-kv. pin-type bus supports. The four high-tension positions are controlled through one G.E. and three Westinghouse oil circuit breakers of high interrupting capacity. These are remote-controlled from the switchboard inside the substation building. The breakers have a rating



View of newly rebuilt Albina substation of Northwestern Electric Company.

of 400 amp. at 73 kv., and an interrupting capacity of approximately 4,200 amp. at 66 kv. Lightning protection is afforded by a 73-kv. Westinghouse auto-valve type lightning arrester connected to the bus. Fourteen 600-amp., 73-kv., 3-pole, gang-operated, Bowie switches are installed for disconnect and bus-tie purposes.

The incoming 66-kv. circuits are metered through two G.E. and four Westinghouse oil-cooled, outdoor-type potential transformers and six Niagara air-insulated current transformers rated 300-600/5 amp. The latter are mounted on the steel framework near the building. The circuit feeding the substation is metered in the building on the 11-kv. side.

This switching station was put into service in December, 1925, and permits a more centralized control of the company's transmission system. Through it the main sources of the company's power supply can be tied together or isolated and, in emergencies, power can be delivered to or received from the Portland Electric Power Company.

Fuse Renewals Facilitated by Handy Storage Rack

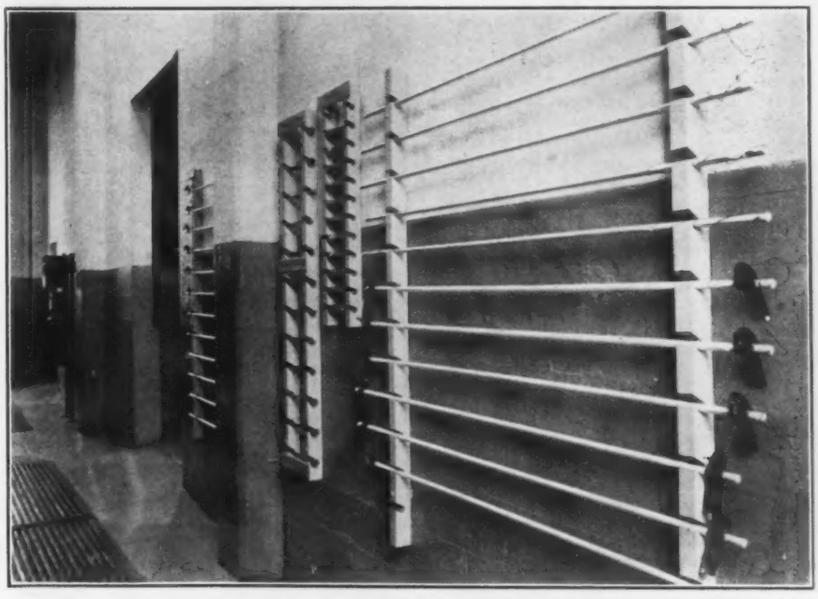
The disposition of spare high-potential fuses around many a substation is a troublesome item. Fuses for 11,000-volt service and especially those for 60,000-volt service are awkward things to take care of. They are stored frequently upon shelves in the store room or stacked on end in some corner, and in either case are subject to breakage and are not quickly accessible when occasion for their use arrives unexpectedly.

At Newark substation of the Pacific Gas and Electric Company the neat arrangement shown in the accompanying illustration has been rigged up by the operating force. The racks are made from such lumber as was available at the station and are bolted to the wall of the 11,000-volt bus-room. In this location they are readily accessible from the operating room, the condenser room or the outdoor 60,000-volt potential transformer installations.

The fuses which appear in the foreground are 3-ampere 100,000-volt units, part of which are fitted with clips ready for installation on a moment's notice. Next is the rack carrying the 11,000-volt cartridges, and the third rack carries 2,300-volt bank fuses at the top, telephone fuses at the center and heavier station bank fuses at the bottom. The 60,000-volt units are in the rack which is mounted between the post and the doorway. Each different grade is labeled plainly with stenciled signs.

The racks are inexpensive, provide adequate storage space for spare fuses, place spare units where they are readily accessible though out of danger of breakage, and actually improve the neat appearance of the room.

Marble dust has replaced asbestos fiber for the glass-tube packing for the higher potential fuses. It has been found that marble dust does not absorb any moisture, can be readily poured into the tube, as readily extracted from the tube, and prevents a large portion of unnecessary fuse failures. Ends are sealed with plaster-of-paris. This seal is broken easily when it is desired to break it, but of sufficient strength to withstand securely all normal usage and service conditions, including severe weathering.



A neat arrangement for storing spare potential fuses where they will be at once readily accessible and safe from damage.

Vinegar gives quick relief from boiler-compound burns. As is widely known, boiler compounds are highly caustic alkalis from which painful burns may be received if the compound comes into contact with the body. In and around plants where boilers are used constantly the use of boiler compounds is comparatively common, and consequently the possibilities of burns from accidents in handling are many. A glass-stoppered bottle of ammonia in a handy place will serve as an efficient first-aid station. In fact, several bottles placed in convenient locations and with suitable protecting holders would be a good investment around the steam-plant boiler room.

New Relays.—Relays similar in appearance and general operating characteristics to the well-known induction type have been developed for application to d.c. systems, according to the Westinghouse Electric & Manufacturing Company. These new relays operate on the magnetic-vane principle and are superior to previous d.c. relays in that they are more accurate and that they may be adjusted for different values of operating current, voltage and time.

IDEAS FOR THE CONTRACTOR

Medico-Dental Building Designed for Continuity

Every Precaution Taken with Electrical Apparatus to Guarantee Uninterrupted Essential Services

By T. B. HUNTER, of Hunter and Hudson, Consulting Engineers

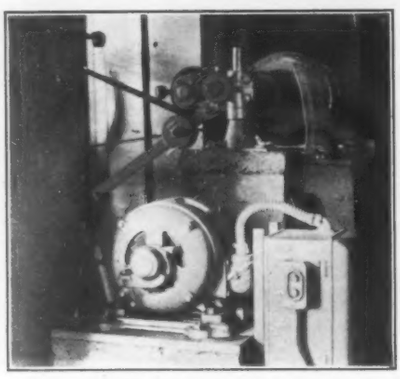
Nowhere is continuity of service more important, perhaps, than in a building devoted to the treatment of human ailments, the performance of the delicate operations upon which the health of human beings depends. Next to a hospital a building designed solely for physicians and dentists is to be classed in such a group. It must be provided with such installations of machinery as will guarantee uninterrupted service of the requisites to modern surgery, pure water supply, electricity supply, and compressed air supply. These must not fail since the moment of their failure conceivably might be the crucial moment in a delicate operation in which they might play an all important part.

The Medico-Dental Building, located at Post and Mason Streets, San Francisco, demanded just this type of mechanical service, a service uninterrupted by any of the accidents of fate, flood or fire. The building was being designed as the model for all such buildings, and therefore, in considering the electrical and mechanical installations, the demand was simple but unmistakable. There must be no failure of any of the essential services of water, electricity or air.

Drinking Water System

Possibly the most important of the three is water. Therefore elaborate preparations were made in the new Medico-Dental Building for water supply and purification. Located in the attic of the building, the water tanks for drinking water, as well as for fire protection, have been housed. The drinking water is cooled by means of a Vulcan ammonia compressor and equipment. This system supplies chilled and purified water to all parts of the building. Spring Valley water is used but provision has been made for well water from the building's own wells in case of failure of the regular city supply. A tank in the basement is provided for well water should occasion to use it require.

The Medico-Dental Building, recently opened in San Francisco. Every means to make the essential services to the tenants of this building interruption-proof has been taken.



Motors mounted on cork to eliminate the transfer of vibration in the ventilators.

The drinking water is run through a filter and then sterilized with ozone to kill all of the bacteria it might contain. The water is chilled to 40 to 45 deg. F., and circulated by means of pumps throughout the building. The overflow is returned to the tanks and rechilled.

Water to the two top stories of the building is supplied from an auxiliary pressure system, the head from the tanks in the attic not being considered sufficient. The intake for this auxiliary system is from the tanks supplying the remainder of the building. Two electrically driven pumps operating a closed pressure tank system with air cushion, supply these two stories with water.

Three pumps in the basement supply water to the tanks in the attic for the water supply systems. These pumps are run by three 15-hp. Robbins and Myers, 220-volt, 3-phase, 1,750-r.p.m. motors. E.C.& M. auto compensators are employed in connection. The motors are controlled by means of automatic float switches located in the tanks. Three are used, and each is cross-connected so that no trouble will be experienced. One is used as a standby to insure operation.

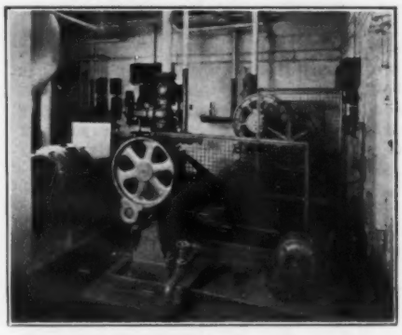
A panel board has been developed by us to provide a high and low water alarm in connection with the tanks in the attic. Located in the basement engine room, the panel has on it an 8-in. gong and a red lamp and a 6-in. gong and a green light, both operated from the float switches in the tanks in the attic, the red being to warn of high water and the green of low water. These are signals to provide the engineer with a warning in case the float switches fail to operate the motors running the pumps. The gong gives warning, and the colored lamp indicates whether the motors should be shut down or started. General Electric switches are used on this board, with Auto-call gongs.

Fire Protection System

Beside the drinking water supply, a fire supply is provided, having separate tanks in the attic. The fire pump is automatically controlled by an E.C. & M. automatic compensator. A 100-hp. Robbins and Myers motor, 1,750 r.p.m. drives a 500-gal. per min. Hill centrifugal fire pump at 200-lb. pressure. A small auxiliary fire pump maintains pressure in the lines at all times and takes care of small leaks for which the main pump would not start operating.

Electrical Equipment Complete

Not only is the electrical equipment of the building designed for present day high standards, but provision has



The auxiliary motor driving the pump which maintains the pressure in the standpipe.

"A beautiful installation" is the main switchboard. The workmanlike manner in which the conduits leading from the board are installed should be noted. X-Ray apparatus is controlled by the left end of the board, lighting the center, and power the right end of the board.

been made for increased use of electricity in the future. The main switchboard is 36 ft. 6 in. overall, and has provision for separate control of X-Ray apparatus, lighting and power.

The X-Ray equipment is supplied from a separate bank of transformers leading to a separate section of the main board. A separate service from the main switchboard is run to the X-Ray equipment in each individual doctor's office requiring it. This eliminates every possibility of interrupting service to all such apparatus caused by trouble on any individual set.

Every floor is supplied with two lines of 2-in. conduit, at present empty, running from the switchboard to the corridor ceiling. This conduit completely encircles each corridor. Ceiling outlet boxes have been provided at convenient locations so that additional service may be provided as the need may arise with the necessity for only a small hole being made in the corridor ceiling to provide it.

Another line of 1½-in. conduit is run to various parts of the building so that the direct current system may be extended.

One electric riser shaft in the building provides room for all circuits leading up from the main switchboard. Provision is made for an additional riser shaft in case another wing is added to the building later.

Elaborate Call System

An elaborate call system is installed throughout the building and is adapted to the particular needs of each physician or dentist. All of this system is installed with bridal wire and when two or three pair are required, lead covered cable is used. In all particulars every effort has been made to make such equipment as near trouble-proof as possible.

Transformers of 1,500-watts, 110-volt to 24-volt, to operate the system are located on alternate floors. A push button layout is provided in every suite of sufficient elaborateness to require it. All buzzers are installed in outlet boxes covered with brass plates so as to be concealed. The push button circuits are also concealed. Tone changes are secured in the buzzers, which are all of the same type, to eliminate confusion and multiplicity, by mounting them on materials of various kinds, including wood, felt, brass, etc. Couch annunciators are used where elaborate call systems are necessary, and are set flush with the walls.

Phone circuits are also concealed, being led to the wiremold and concealed in 1-in. conduit drops. The 1-in. conduit allows sufficient room to care for any type of service required.

An intercommunicating phone system has been installed by Broemmels Pharmacy on the second floor to 36 or 40 offices in the building to provide direct service for prescriptions to physicians desiring them. Circuits for this system have been run in lead covered cable and made in every respect a first class job.

Much Special Equipment

Several offices are equipped with electric refrigerators to care for vaccine and serum containers. A great deal of special medical equipment has been installed, too, in many doctors' offices. Special provision has been made also for each kind of dental unit, of which there are a large number of types, many quite elaborate.

Compressed air is distributed throughout the building. It is provided from compressors in the basement and piped to each office. To eliminate every possibility of moisture or oil in the compressed air service, however, the air, after compression, is run through two Crane steam separators, then through an aftercooler. The latter device, cooled by water or brine, chills the air and precipitates any residual moisture or oil.

Ventilation has been given extraordinary attention. Located in the attic, near the water tanks, are two large exhaust fans. One exhausts the air from the laboratories and the inside dressing rooms, while the other exhausts the air from the inside toilet rooms. A 7½-hp., 870-r.p.m. and a 2-hp., 870-r.p.m. motor, both driving Sturtevant blowers, accompish this work.

To prevent the vibration which would interfere with the physicians' sensitive

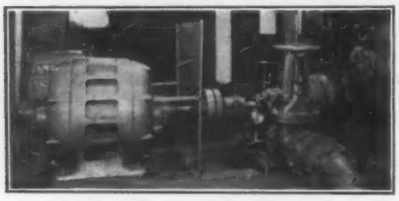
Automatic compensators controlling the motors which drive the house pumps supplying water to the tanks in the attic, may be seen in this photograph. The sump motors may be seen at the right, together with switches and control apparatus. The signal lights and gongs may be seen just above and to the left of this equipment.

stethescopes, these motors have been mounted on wood and cork.

Heating, Vacuum and Sewage

Heating of the building is accomplished by steam heat. W. S. Ray oil burners, electrically driven, are installed on the boilers. A motor driven oil pump supplies oil for all burners and the incinerator. A Nash electrically driven vacuum pump supplies the steam return on the heating system.

An electrically driven central vacuum sweeper system has been installed throughout the building. A line from this system has been run to the garage to be used for cleaning the upholstery in closed cars. A remote control switch from the garage sets the vacuum cleaner equipment in operation in the instance that it is not operating, such as on Sundays or after hours. A pilot light in the garage indicates whether or not the vacuum equipment is operating so that garage men may know whether or not to turn it on for their uses.



For the fire pump, this sturdy motor is used direct-connected.

An air compressor is also a part of the garage equipment. There is also a fan to supply fresh air to the boiler room. A sewage pump to take care of basement waste is provided, since the basement is located below the street sewer level.

The Medico-Dental Building is unique in many respects, not the least of which is that every tenant is a stockholder in the corporation which owns it. It was designed by George W. Kelam, architect, with William G. Marchant, associated. The Turner Company, mechanical and electrical contractors, were responsible for the mechanical and electrical installations, while the Drendell Electrical & Manufacturing Company provided the switchboard. Hunter and Hudson were the consulting electrical engineers.

Contractor Installs Underground System for Tract

Manholes Designed for Underground Installation at Santa Barbara Tract Accepted as Standard

An underground system to serve a large realty tract in Santa Barbara, known as Samarkand Hills, was installed in its entirety by the Nielson-Smith Electric Company, Electragists of Santa Barbara, and not only was the installation wholly acceptable to the power company and the telephone company serving in that territory, but the manholes designed and installed on the project were considered good enough to adopt as standard for all future installations of the same kind by these companies.

The Samarkand tract is a large new subdivision recently put on the market in Santa Barbara. It is a highly restricted subdivision, containing 213 lots, and spreading over several blocks. (Fig. 1.) It was desired by the company handling the tract to provide adequate underground services of both electricity and telephone so that the tract might be entirely free of overhead poles of any kind. The First National Bank of Santa Barbara, as trustees for the Hollister estate, is financing the project.

In order to meet the approval of the Southern California Edison Company and the Santa Barbara Telephone Company, O. H. O'Neill, consulting engineer, carefully laid out the complete installation. The work of installing the entire underground system, however, was done under the personal supervision of W. C. Nielson, of the Nielson-Smith Electric Company. The complete job, including the trenching, concrete work, conduit work and finishing was accomplished in 45 working days.

To serve the 213 lots in the tract the system was laid out so that two large primary manholes and 50 smaller manholes containing secondary vaults would care for the tract. As will be seen in the accompanying drawings separate manholes were provided for the power company and the telephone company. Each company is to maintain its own vault.

The large power vault was built 6 x 8 ft.. and 7 ft. deep. The telephone vault adjoining it was smaller, being 4 x 5 ft. and 5 ft. in depth. For the smaller dstribution manholes, the power company vault was reduced to 4 x 4 ft. and 5 ft. in depth. The telephone vaults were kept the same size throughout. Each was fitted with a drainage sump and was constructed with proper reinforcing according to its particular requirements. Standard telephone company and Edison company manhole castings and covers were used in their construction.

The primary system was laid in 3-in. Benico fiber duct, centered in a 9-in. concrete raceway, three inches of concrete being the minimum requirement on each side of the duct. Conduit laterals to the property line were run on top of this concrete raceway. For the power circuits, 1½-in. conduit is used, and for the telephone lines, ¾-in. conduit. Conduits for both telephone and power were run to the property line of each lot in the tract. Lead covered services will be pulled to each lot from the manhole nearest it as service is needed.

For the entire job 16,500 ft. of 3-in. Benico duct was used, serving the primary system. A primary voltage of 2,400 volts has been run to each

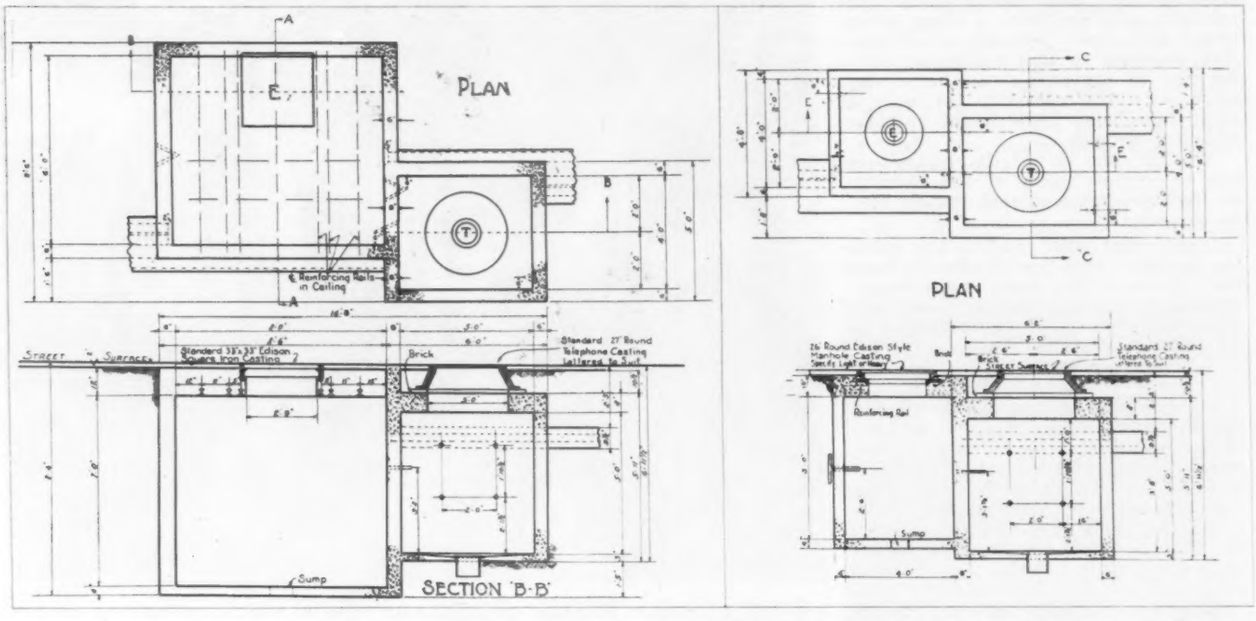


Fig. 2. Plans of the manholes used in connection with the Samarkand Hills underground system. At left the primary manholes, at right those for secondary distribution. The telephone manholes are shown adjoining, marked "T."

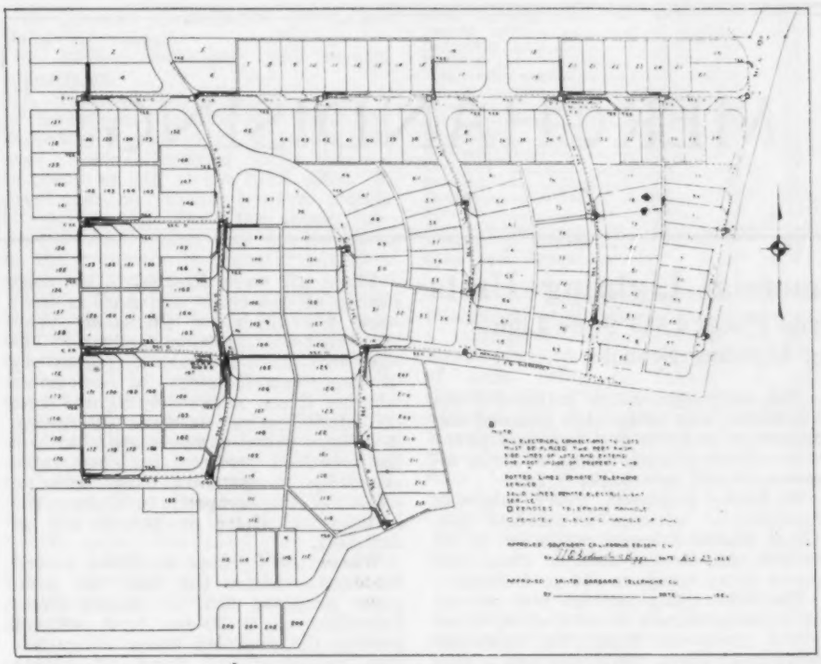


Fig. 1. Thact map of the Samarkand Hills subdivision in Santa Barbara, showing the layout of hanholes and conduits to serve each lot with electric and telephone service through an extensive underground system.

vault. For the service to each lot, 15,000 ft. of 1½-in. conduit was used. This will be of sufficient size to care for either 110 or 220-volt service to the residences to be erected on the tract. For the telephone system, 15,000 ft. of ¾-in. conduit was used.

Strip Lighting Inexpensive Yet Effective Lighting Method

A comparatively inexpensive and yet novel and effective way of attracting attention to some particular building for advertising its presence to the surrounding territory, is to light strips or sections of that building in colors at night. Ordinarily when night illumination is proposed the first thought is always of floodlighting, and while this is the most effective method, yet in many cases the singling out of some certain feature of a building for color lighting is very effective. Moreover, it may be accomplished within the available budget which many business firms, that would not floodlight completely, can provide for similar means of illumination.

Strip lighting has an added advantage in that it is installed on the building itself, requiring no easements or negotiations for flooding from some distance on other building or property. It is something which almost any contractor can feel he is equipped to produce, and which is adaptable to the small town as well as to the large city.

One of the better known examples of this type of lighting is that of Miller's Lafayette Cafe in Los Angeles, illustrated here. The photograph of the cafe and the diagram illustrate both the effect produced and the simplicity of the installation.

At the foot of each column between windows, an X-Ray projector has been mounted. The projector was equipped with a concentrating reflector. With a natural colored cover glass it is possible to project and control a narrow beam of colored light upon each column. By using different colored cover glass in each of the units a striking effect is produced. The columns of the building shown in the illustration are lighted in red, yellow, green and blue, and have been alternated and changed on different occasions.

In this installation the No. 51 type of Curtis Lighting, Inc., projector is employed. Each unit used in this class of work is equipped with a 250-watt G-30 floodlighting lamp. The projectors are fastened to the wall and may be adjusted easily to control the rays of light. Outlets may be provided in a number of ways as shown in the diagram. In this instance a row of plants is used to screen the units from view.

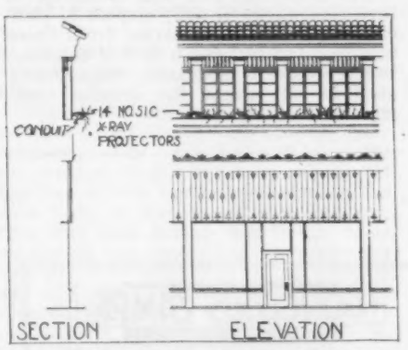


Diagram showing the method of placing lighting units to obtain strip lighting effects on a building. The units are shown concealed in plants at the second floor line of the building.

Question Box

Arrangements have been made to answer through the columns of the Journal of Electricity such questions on electrical construction and other subjects as are of general interest. Inquiries should be sent to the Editor, Journal of Electricity, 883 Mission Street, San Francisco.

Q. 2. What is the "Navy Specification" for length of conduit nipples?—S.M.D.

A.

I.P.S.	Lengths	
	Short	Long
In.	In.	In.
¼	1½	2½
½	1½	3½
¾	2	3½
1	2	4
1¼	2½	4½
1½	2½	4½
2	2½	4½

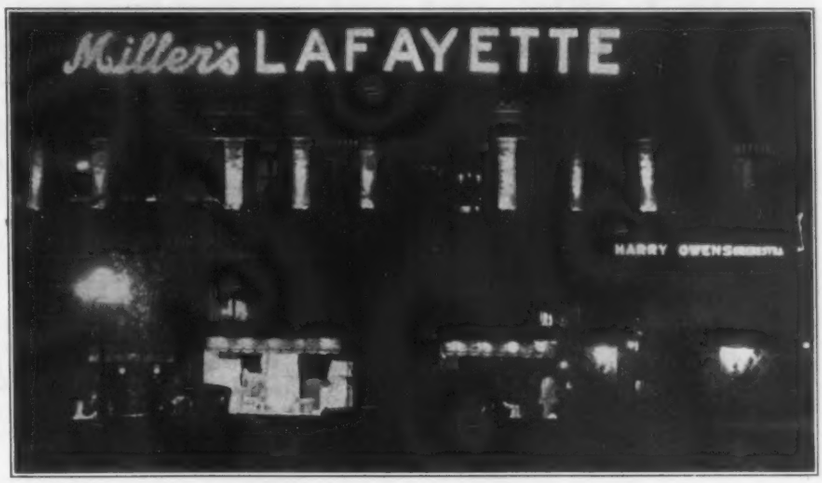
Q. 5. What is the melting point of pure copper? Pure gold? Pure platinum?—T.L.J.

A. Pure copper, 2,550 deg. F. Pure gold, 2,016 deg. F. Pure platinum, 4,100 deg. F.

Q. 4. What current is required to fuse the following size and type of wires?

No. 10 copper, No. 14 German silver, No. 22 iron, all B&S gage.—G. McM.

A. No. 10 B&S copper=333 amp.
No. 14 B&S German silver=85 amp.
No. 22 B&S iron=12 amp.



Strip lighting in colors as applied upon a cafe in Los Angeles. The columns are lighted each in a different color. The roof sign is not a part of the strip lighting layout.

BETTER MERCHANDISING

High Record Set in Commercial Lighting Units

Public Service Company of Colorado Places 4,855 Store Lights in Campaign Following Lighting School

In an eighteen-day campaign during March, the Public Service Company of Colorado placed 4,855 commercial lighting units, exceeding the budget set by more than 16 per cent and establishing what is declared to be a high record in the country for this phase of sales exploitation. These units were placed in stores, offices, workshops and factories on a 30-day trial agreement. Final results of the campaign cannot be compliled until the probation period has expired. As proper care was taken by the salesmen to place these units only in those establishments which plainly were in need of better lighting facilities, it is confidently anticipated that the great majority of them will be accepted.

The campaign followed close upon the heels of the lighting school conducted by Nela Park experts at Denver during the week of Feb. 15. The success encountered in this drive reflects directly upon the salutary effect of the school, details of which were noted in the Journal of Electricity for March 15.

The campaign, which featured Delta Storelites, was thoroughly planned and organized and the way was well paved with effective advertising of both direct-mail and newspaper types.

In listing prospects, every salesman reported in advance a selected list. These varied from a minimum of 20 to the man in the smaller cities and towns to as many as 100 in Denver.

The advertising barrage was opened by personal letters to each of these selected prospects from the salesman concerned. These were followed a few days later by a 6-fold, 2-color broadside. Then came a second personal letter signed by the salesman. Advantage of personal relationships existing between prospects and salesmen was taken in attaching the signatures of these latter to the letters.

Newspaper advertising consisted of three insertions in daily papers of each city covered. These varied from three columns, ten inches up to five columns, twelve inches, prepared mats being used in all except the smaller communities.

These ads were directed to the merchants of the cities and had as their basis the appeal of increasing sales through better lighting facilities. The offer was made to make a free survey of any establishment to determine whether it was adequately lighted from the profit-making business standpoint. A definite promise was made to inform the merchant just how his store rated according to standard data, with no effort by the company to change the installation where it tested out as sufficient.

Where the lighting facilities proved inadequate under the test, the company proposed that it install Delta Storelites on a 30-day trial without placing the prospect under obligation. The merchandising force of proper lighting was emphasized and every merchant was challenged to prove or disprove the theory in his own particular instance. Twelve-months payment terms were specified.

A boxed statement in each ad condensed the advertising message under the following six heads:

1. Open to all merchants—large or small.
2. Free trial installation subject to your approval.
3. Twelve months to pay.

Advertisements employed in selling better lighting. The large one in the center was that used in Salt Lake in a successful portable lamp campaign. (See page 215.) The one used in the commercial unit sale in Boulder, Colo., is at the right, top; the diminishing discount sale advertisement on portable lamps below it.

4. Includes installation of latest Delta Storelites.

5. Skilled workmen and careful supervision.

6. Genuine Mazda lamps.

The response to this advertising was exceedingly gratifying. No coupon was used, those interested being advised to phone or call at the local office. A great many merchants, however, merely clipped the ads from the papers, appended their names and mailed them to the company to signify that they welcomed further light on the matter.

Sales forces were concentrated on the campaign and every available man was utilized. In Denver the domestic sales group was enlisted in the drive and turned in one of the best score sheets on the system.

Singularly enough, the mining city of Leadville, isolated almost at the summit of the Continental Divide, led in percentage performance. With a quota of 75 units, William Wrenton and his corps there installed 359 units, which constituted 478.7 per cent of their allotted number. The following totals show the results elsewhere over the system, the listings being by sales groups:

	Placed	Quota	Per-centage
Denver domestic	2,631	1,158	237
Colorado Power	585	295	198.3
Salida	90	60	150
Idaho Springs	36	25	144
Denver total	3,320	2,618	125.7
Lafayette	75	60	125
Boulder	433	350	123
Total company	4,855	4,198	116.2
Denver fixture	216	200	108
Windsor	54	60	90
Alamosa	62	75	82.6
Cheyenne	164	200	82
Western division	709	930	76.2
Loveland	74	100	74
Sterling	38	60	63.4
Denver commercial	513	1,100	46.6
Special	29	125	23.2
Fort Collins	64	300	21.3
Window 18, Denver	1	10	10
Sales floor, Denver	7	150	4.7

The five highest individual accomplishments of the campaign, figured on a numerical basis, were in the domestic division at Denver, placements of units being as follows: F. N. Brewer, 229; Phil Gorman, 212; L. R. Stinson, 203; R. P. Rudesil, 186; B. G. Harrison, 166. Mr. Brewer, who set the pace, averaged nearly 13 units each day. Oscar Rost of the Denver commercial division had a total of 198 units to his credit.

The campaign was directed by G. B. Buck, new business manager of the company.

Total expenditures for newspaper advertising were $1,758. The two mailings of personal letters totaled 6,000, while the broadside went to 10,000 prospects, including every establishment listed in the territory.

Mountain Utilities Successful with Portable Lamps

Colorado Company Sells 25 Lamps in an Hour; Utah Company Gives Convenience Outlet with Each Lamp Sold

Two mountain companies, merchandising portable lamps actively for some years, recently used novel sales means to promote the disposal of a large number of lamps, each of which should prove useful to the lamp merchandiser anywhere. The first, the Public Service Company of Colorado, in reducing its stock, used the diminishing discount sale with good effect. The other, the Utah Power & Light Company, adopted the plan of giving with each lamp a convenience outlet, thereby removing the greatest sales obstacle to the sale of lamps or other electrical appliances.

The Diminishing Discount Sale

The Public Service Company of Colorado sold 25 portable lamps in one hour at Boulder, Colo., not long ago in a novel sale intended for stock reducing rather than profit. Having overbought on lamps of this type, the local manager, Frank S. Henderson, decided to give the public some real values and at the same time promote a sale with institutional advertising features. It was late in the season and something out of the ordinary had to be evolved.

The medium selected was a diminishing discount sale. From 8 to 9 o'clock a discount of 30 per cent from regular prices was offered; from 9 to 10 a 25 per cent discount; from 10 to 11 a 20 per cent discount; from 11 to 12 a 15 per cent discount; and a 10 per cent discount throughout the remainder of the day.

All portable lamps in stock were offered. Usual terms of payment of 25 cents down and the balance monthly with the customer's light bill prevailed. The sale was announced once only through 3-column, 11-in. ads in each of the two daily papers on Thursday evening, two days previous to the sale.

The results obtained are interesting. A total of 27 lamps was moved, their combined sales price being $353.81, or an average of $13.10 to the piece. All but two of the lamps went during the first hour, at the 30 per cent discount. One was sold during the second hour at the 25 per cent discount, while the last one was taken out of the store in the afternoon, when the 10 per cent discount prevailed.

Mutton Chops Fail to Work

The same company met a different reaction at Fort Collins. This city is the center of one of the principal lamb-feeding sections of the Rocky Mountains. Owing to the low price prevailing on sheep during the spring, strenuous measures had been taken there to promote mutton eating in Colorado and neighboring states to boost the price and aid the feeders.

Seizing upon mutton as an article of paramount interest in the community, the Public Service Company advertised a one-day portable lamp sale, offering two pounds of choice-cut mutton free with each purchase, with a leg of lamb to each of the first three buyers.

Curiously enough, no mutton was distributed. Several persons looked over lamp stocks, but the day closed without a sale having been recorded.

Fort Collins and Boulder are the same-sized cities, each containing about 12,000 persons.

A Free Convenience Outlet

Another unusual and very effective method of making the portable lamp campaign successful was recently adopted by the Utah Power & Light Company at Salt Lake City. During this sale, which covered a period of about three weeks, the power company agreed to install, absolutely without cost to the purchaser of any lamp in the collection offered, a duplex floor outlet. Approximately three hundred lamps were sold during the period, and the free convenience outlet idea was undoubtedly responsible for a large percentage of such sales.

The resistance which is very often encountered in selling floor lamps, for the reason that the prospective purchaser has no convenience outlet to which the lamp may be attached, was largely overcome in this instance.

Bids covering the installation of these outlets were received from a number of local contractor-dealers, and a flat rate of $5.75 per outlet was obtained from the successful bidder. The large volume of sales largely compensated the power company for this additional cost.

The free convenience outlet offer was prominently displayed in the company's newspaper advertising, and window displays also conveyed the message to the public.

Range Campaign of Washington Water Power Successful

During a special campaign conducted from June 21 to July 31, 1926, The Washington Water Power Company sold 309 Westinghouse electric ranges and water heaters over its system, representing gross sales of about $50,000. This was the second range campaign conducted this year. Of the 309 ranges sold, 214 were installed in the city of Spokane and 95 in the outside territory.

The campaign featured the Westinghouse Junior Cabinet Model, although other models were also sold. Of the total sales, 221 were Junior Cabinets. The only special sales feature was the reduction of the down payment to $4.75. The ordinary selling policy of The Washington Water Power Company was used whereby in the city the regular salesmen worked on a 10 per cent commission basis with special prizes for the greatest number of sales during each week and during the entire campaign. J. R. Weideman has highest city salesman with 26 ranges to his credit and W. E. Collins second with 23 ranges. The plans and policies were outlined for the city work by Lewis A. Lewis, sales manager, and R. B. McElroy, assistant sales manager, while those of the outside territory were under the direction of J. F. Farquhar, general agent.

It is estimated that these ranges will bring the company a gross revenue of about $25,000 per year and increase the total number of ranges on The Washington Water Power Company's system to nearly 8,000.

Model Home Displayed in San Francisco.—The $35,000 home of A. J. Lang of San Francisco, located in Forest Hill, was displayed for a period of three weeks in June as a model electric home. The display was made under the auspices of the San Francisco Chronicle and the realty concern promoting the subdivision. The home was complete in electrical equipment, including range, water heater, air heating and refrigerator.

NEWS OF THE INDUSTRY

Hetch Hetchy-Modesto Standby Contract Ratified Over Official Protest

Modesto Irrigation District will receive standby service to the extent of 3,000 kw. from the Moccasin plant of the City of San Francisco as the result of a contract ratified by the San Francisco supervisors. This service will be furnished for a flat charge of $4,200 per annum and a kilowatt-hour charge of 4.7 mills for all energy used. The contract was protested by both M. M. O'Shaughnessy, city engineer, and John J. O'Toole, city attorney. Modesto will construct immediately a 9,000-kw. substation at a point in the district adjacent to the Moccasin-Newark transmission line.

The ordinance ratifying the contract sets forth that the agreement covers the furnishing of hydroelectric power to the Modesto Irrigation District for pumping and municipal purposes as provided for in the Raker Act, and states that the maximum amount of power to be furnished is not to exceed the total connected load for pumping, irrigation and municipal purposes.

In discussing the contract prior to its passage City Engineer O'Shaughnessy said: "The contract should prohibit this, for the reason that while we are obliged to furnish the district the amount of energy that they require for the specified purposes under the Raker Act at actual cost, we are not obliged to furnish them any energy beyond this, especially when by so doing it will cause the city to lose additional revenue which might bring the total loss of revenue up to more than $90,000 or even $132,000 a year.

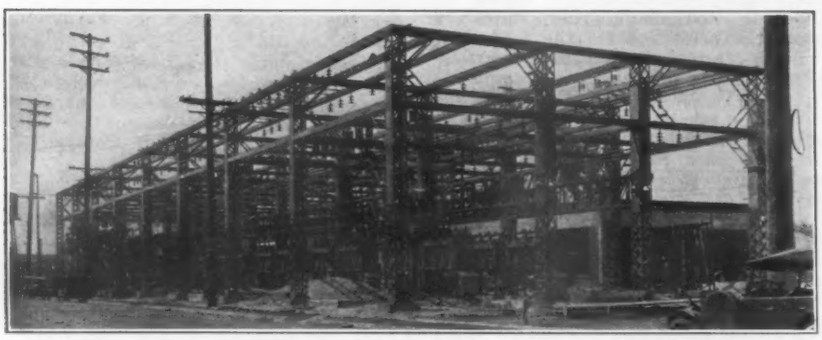
"To support the general statements that I have made, let us see how this contract as it is now drawn would have worked out for the city if it had been in effect in 1925. In that year the Modesto Irrigation District used for pumping, drainage and municipal public purposes (which are the so-called Raker Act purposes) a total of a little less than 3,000,000 kw-hr. of electrical energy. According to the statement of their electrical engineer, Mr. O'Connell, the maximum demand at any time during the year for this service amounted to 1,350 kw., and the connected load was 2,300 kw. During the same period of time the total amount ofelectrical energy delivered to the Modesto District was 9,300,000 kw-hr., and the maximum demand or peak load in distributing this amount of energy was between 4,200 and 4,500 kw.

"Now, if the contract was limited purely and solely to furnishing the power for Raker Act purposes during the year 1925, and the district took all the power that they required for those purposes, we would have received from the district the sum of $14,100 on the basis of 4.7 mills per kw-hr. If this power was used by the district only as standby when their lines were out, the city would have received for this service only $4,200.

"It is not, however, the intention of the Modesto Irrigation District, nor does this contract bind the district to buy from the city the power required for pumping and municipal purposes. What the district wants and what it aims to get under this contract is what is known as standby service. This means that the district will use its own power plant for operating the pumps and for other purposes specified under the Raker Act, and will call upon San Francisco to furnish electrical service only at such times as their plant or their transmission lines are out of commission. And what does the contract provide that they pay for this service? The price of 4.7 mills per kw-hr. for the amount of energy actually used, with no reference to or consideration of the load factor. Standby service is not sold or furnished on the basis of so much per kilowatt of energy used. Standby service is sold on the basis of a price per month or per year per kilowatt of demand, plus a rate per kilowatt-hour of energy used. This contract eliminates the demand charge entirely, the most important factor in a standby rate schedule. Established schedules for standby service indicate a rate of from $10 to $24 per year per kilowatt of demand plus, say 6/10 cent per kilowatt of energy used.

"The distribution system of the Modesto Irrigation District as constructed makes it impossible for the district in distributing power received from San Francisco's transmission line to distinguish between that which is used for so-called Raker Act purposes and that which is used by private persons or corporations for other purposes. This clearly indicates it is the intention of the district, should occasion arise, to take from our lines sufficient electrical energy to meet whatever the emergency might require for all purposes.

"The furnishing of the power to the district would, on the basis of a maximum demand of 1,350 kw., have resulted in a reduction of revenue under the agency contract with the Pacific Gas and Electric Company of $42,600, a loss of $28,500, provided the district bought all of the power they required for Raker Act purposes from the city; if used as standby only, the loss would have been $38,400. However, let us suppose that the district's plant went out of service while they were connected with the city's transmission lines. Can you imagine that they would not at that time call upon and take from us all of the power that was necessary to meet whatever demand they had to meet at the time the plant went out? If this should occur at a time of their peak load, it would make a demand upon the city of from 4,200 to 4,500 kw. Now, if under any contract that we enter into with the district it is possible for us to be called upon to furnish a demand service of, say 4,200 kw., it will reduce by that amount the dependable peak that the Pacific Gas and Electric Company may count upon from our plant and that company has indicated to the city attorney that they so interpret the contract. If this contention were sustained, it would reduce the obligations of the Pacific Gas and Electric Company to take all of the output of the Moccasin power plant on the basis of an 80,000-kw. peak at a 75 per cent load factor to taking that output on a basis of, say 75,800-kw. peak, and this would result in a reduction of revenue of $132,500 per year."



Lawrence Street switching center of the Los Angeles Gas & Electric Corporation built to serve the growing industrial district adjacent to Fourteenth and Lawrence Streets, Los Angeles. The present capacity of the station is 5,000 kva., with fifteen 16.5-kv. lines and five 2.3-kv. circuits. Designed to provide for yearly increase in capacity as needed, it ultimately will have about thirty 16.5-kv. circuits and one or two 30,000-kva. synchronous condensers. The cost of the present development is estimated at $300,000.

Edison Company's Engineering Department Reorganized

The engineering department of the Southern California Edison Company, Los Angeles, has been subdivided into two parts, one to be known as the civil engineering department and the other as the department of engineering design.

The civil engineering department will be responsible for all reconnaissance, surveys, water records and the determination of all dams, tunnels, flumes, ditches, canals and other works of a civil engineering nature in connection with the company's properties. H. W. Dennis, formerly construction engineer, has been appointed chfief civil engineer in charge of the department, reporting directly to G. C. Ward, vice-president. Walter Sawyer has been made Mr. Dennis' assistant. The department will consist of three divisions: preparation of maps under the direction of G. H. Starbuck; right-of-way under H. C. Schofield, and surveys under J. S. Mayall.

Responsibility for the preparation of the designs, plans and specifications in connection with all electric, mechanical and hydraulic work as requested by other departments of the company has been placed upon the department of engineering design. This department will be in charge of H. L. Doolittle, formerly assistant construction engineer, who has been made chief designing engineer, reporting directly to G. C. Ward. The department has been divided into three sections: mechanical, under R. M. Peabody; structural under C. B. Carlson, and electrical under W. R. Battey and J. C. Gaylord, formerly planning engineer of the engineering department, his assistant. The electrical division is subdivided into substation design under C. C. Long, and transmission design and 220-kv. stations under F. H. Mayer.

Electric Sign Market Development Program Begun by S.E.D.

Members of the advisory committee, appointed by W. W. Freeman, president of The Society for Electrical Development, to sponsor and direct the electrical advertising co-operative market development program, in a recent meeting at the headquarters of the society, agreed that the organization of sign manufacturers for the establishment of business practices which will aid in developing the market profitably is desired by everyone in the industry; and that the program be initiated without further delay by underwriting the minimum organization expenses, preparatory to inviting the united support and membership of companies and individuals engaged in or interested in the sale of commercial electric signs, spectacular electric displays, illuminated poster panels or painted bulletins, traffic signals, directional signs and the like.

In other words, it was decided to postpone distribution of the Plan Book of organization, which was submitted and approved, pending the reports of subcommittees covering survey of the potential market, local sales plan, and recommended basis of membership. Meanwhile the underwriting fund of $15,000 pledged at the meeting insures getting the program under way immediately.

Following the next meeting of the advisory committee at which time it is expected that the above reports will be ready, copies of the Plan Book, together with membership application blanks, will be sent to all concerns in the industry with the recommended basis for estimating subscriptions, providing for minimum company membership at $25, the dues of individual members already being established at $10.

Power Contracts to Determine Height of Dams on Project

Preliminary steps for the development of the proposed $20,000,000 hydroelectric project of the Grays Harbor Railway & Light Company, of Aberdeen, Wash., on the Cowlitz River, near Mayfield, are being taken rapidly, W. W. Briggs, vice-president and general manager of the company, reports.

It is probable that two dams will be constructed in the development, Mr. Briggs states, the main one in the vicinity of Mayfield and a second dam at Mossy Rock, a canyon about nine miles above Mayfield. This will create an impounding basin to insure an adequate supply at all times for the main basin at Mayfield. Mr. Briggs states that the height of the two dams will be determined largely by the power contracts that the company obtains previous to the actual construction. Negotiations are now under way with several large corporations which are contemplating plants in the Grays Harbor district, and the amount of power they will require will influence materially the company's plans for development, Mr. Briggs says. The first development plans call for construction of an $8,000,000 plant.

Recommends Change of Yosemite Bounds to Develop Power

An adjustment of the boundaries of the Yosemite National Park so as to eliminate twelve acres from the southwest corner of the reservation has been recommended by F. E. Bonner, district engineer at San Francisco for the Forest Service. This change is regarded as desirable so as to permit the development of the power resources of the South Fork of the Merced River. An application covering the project has been filed by the San Joaquin Light & Power Corporation, Fresno, Calif.

A reservoir essential to the development inundates an obscure corner of the park without any claim to scenic beauty. A dam 330 ft. high will make possible the development of 33,800 hp. of primary power.

Plans Completed for Extension of Skagit Project Railway

Completed plans for the extension of city of Seattle's railway along the Skagit River, as part of the Skagit power project development, have been announced by F. R. Nichols, special engineer of the Skagit project under J. D. Ross, superintendent of the lighting department. In the proposed $350,000 extension of the railway from the tunnel intake at the present power house to Diablo Canyon, site of a 350-ft. masonry dam, there will be included a 1,170-ft. trestle at a 33 per cent grade. By means of the trestle the company will be able to carry material for building the dam directly to its site. It is estimated that 5,000 tons of material can be carried over the railway daily to the dam site, and that this will insure completion of the dam in seven months after work is started, Mr. Nichols declares. The extension will be 4½ miles long. With the exception of the trestle portion, the new railway will be equipped with trolley; on the trestle will be a cable and carrier car.

Power Company Seeks License for Flaming Gorge Project

The Utah Power & Light Company has applied to the Federal Power Commission for a license in accordance with its preliminary permit of Aug. 15, 1923, covering the company's proposed development at Flaming Gorge on the Green River. Plans call for the construction of a concrete gravity dam 875 ft. long and 270 ft. high, creating a reservoir 60 miles long with an area of 37,200 acres. Equipment sufficient to develop 63,000 hp. will be installed.

Under a resolution adopted by the commission last year no action is to be taken on any application on the Colorado River or its tributaries, pending an agreement among the states of the basin as to allocation of water. Despite the importance of the Flaming Gorge project, which would regulate completely the Green River above the dam, it seems improbable that the commission will make any exception in the case.

First Hydroelectric Plant in Samoa Completed. — The first hydroelectric plant in Samoa has been completed, and the homes and schools of Upolu now are lighted by electricity, according to press report. A dam has been built just above the favorite swimming pool of Robert Louis Stevenson to store water for power generation.

"The old order changeth"—Operators from all over the system of the Public Service Company of Colorado recently paid their respects to "Old Sally," as the venerable 150-hp. Corliss engine shown at the right of the picture affectionately is called. The first steam generation unit ever brought west of the Mississippi River, "Old Sally" was installed in 1882 and furnished the motive power for Denver's entire electricty supply for a number of years. "She" now has a post of honor on the lawn at the company's Valmont plant near Boulder.

Court Rules Hetch Hetchy Revenue Must Be Used for Redemption and Interest

The supreme court of the state of California has ruled that all of the surplus earnings derived by the City and County of San Francisco from the sale of electric power from the municipally owned Hetch Hetchy plant must be used for the payment of interest on and the redemption of Hetch Hetchy bonds. The decision was rendered in a recent suit brought by Adolph Uhl, suing as a taxpayer and a bondholder, for a writ of mandate to compel the Board of Supervisors to apply all of the surplus earnings from the disposal of Hetch Hetchy power toward debt charges on the 1910 issue of Hetch Hetchy bonds, of which there are outstanding $38,000,000.

The Board of Supervisors had set a valuation of $9,000,000 on the Moccasin power house and the transmission line to Newark, both of which were constructed from the proceeds of the 1910 Hetch Hetchy water bonds. Under a contract between the City of San Francisco and the Pacific Gas and Electric Company the power generated at Moccasin power house is turned into the power company's substation at Newark and distributed by that company acting as an agent for the city, at an annual revenue to the city of $2,000,000. (Journal of Electricity, July 1, 1925, p. 33.) Out of these earnings the supervisors recently had allotted $83,333 to be set aside for depreciation charges and $605,000 to cover interest and redemption charges on $9,000,000 of the Hetch Hetchy bonds, leaving a balance of more than $1,000,000 which was to be applied to the acquisition or construction of a transmission line from Newark to San Francisco and a step-down station inside the city limits. Mr. Uhl contended that that amount, as well as the $605,000, should be applied to payment of interest on and redemption of Hetch Hetchy bonds.

The supreme court of the state upheld him in his contention, and the Board of Supervisors immediately filed a petition for rehearing. The petition was denied, with the result that the allocation of the entire surplus of the Hetch Hetchy operating fund—$1,743,000 as of June 30, 1926—to redeem and pay interest on the bonds has enabled the Board of Supervisors to fix the municipal tax rate at $3.66. Three weeks ago the valuation of Moccasin power house and transmission line had been raised to $15,000,000 and the tax rate tentatively set at $3.77, so that a reduction of 11 cents was made possible through the supreme court's decision. The tax rate for last year was $4.13.

New Reduction in Mazda Lamp Prices Effective Sept. 1

Announcement has been made of further reductions in the prices of Mazda lamps, effective Sept. 1, that amount to approximately 7 per cent on sizes generally used in the new standard line of lamps and approximately 5 per cent on all sizes.

This is the eighth reduction in lamp prices since 1920. This latest reduction means a saving to the public of approximately four million dollars per year. Price reductions on incandescent lamps have totaled 44 per cent since 1914 in spite of the fact that the average cost of commodities has increased 65 per cent since then.

With the price of the 40-watt lamp now at 25 cents the consumer may buy six of these for $1.50, which was the cost of one 40-watt lamp in 1907. For a given amount of money the public buys today more than twenty-one times as much light as was possible in 1880 when the incandescent lamp was new.

The reduction in Mazda lamp prices has been made possible principally by better manufacturing methods, by standardization and simplification of lamp types.

Paper Mill Purchases Two Carloads of Electrical Equipment.—Two carloads of electrical equipment, costing $20,000 recently have been purchased by the Occident Pulp & Paper Mills, Inc., for its plant under construction at Edmonds, Wash. The equipment was purchased from the Allis-Chalmers Manufacturing Company and includes two 12,500-hp. motors, a carload of hydraulic press equipment and two carloads of other machinery.

Third Radio Trades Exposition Conducted in San Francisco

A third successful radio show has just been completed by the Pacific Radio Trade Association at the Civic Auditorium, San Francisco, with a greater number of exhibits and more comprehensive program than at any of the previous radio shows held in that city.

Exhibits were entered by practically every radio manufacturer, every jobber, and by many of the leading dealers in radio supplies in the Bay region. Booths displaying radio apparatus were this year more elaborate than before, and the models displayed seemed to vie with each other to achieve superiority in furniture craftmanship.

The Radio Corporation of America conducted a large exhibition in a wing of the auditorium known as Larkin Hall, in which a miniature broadcasting studio was presented behind a glass partition, the music from it being heard over the various sets on display. This was the only audible display allowed in the show, it being conducted in a separate wing. All other exhibits were asked to keep their sets silent in order to prevent a confusion of sound that would interfere with the programs presented during afternoon and evening of each day by radio artists from local studios.

The exposition was held in connection with the annual convention of the Pacific Radio Trade Association. Arrangements were in charge of Arthur H. Halloran, president of the association; Mark E. Smith, exposition chairman; Elizabeth Gray, secretary, and Anthony A. Tremp, exposition manager.

Two Oregon Utilities Merged to Serve Deschutes Valley

Deschutes Power & Light Company is the name of the new organization formed by the recent consolidation of the Bend Water, Light & Power Company, Bend, Ore., and the Deschutes Power Company, Prineville, for the purpose of making one large utility serve the Deschutes Valley in Oregon. Interests allied with the Pacific Power & Light Company, Portland, and the Bend company recently acquired control of the Deschutes Power Company, the Enterprise Electric Company, Enterprise, Ore., and the Grangeville Electric Light & Power Company, Grangeville, Idaho. (Journal of Electricity, Feb. 1, 1926, p. 114.) In order to facilitate the accounting work of the newly formed Deschutes Power & Light Company all the general books and records will be transferred from the Bend office to the Portland office.

Separate budgets have been made up covering the expenditures for necessary property additions on the Grangeville, Enterprise and Deschutes systems. Items in these budgets include transmission-line connections to relieve shortages, enlarging conductors on transmission and distribution circuits, metering circuits so that the distribution of energy may be known, and other miscellaneous items for the improvement of service. Every transmission-line pole on the Grangeville and Enterprise systems will be inspected, stubbed where necessary and other repairs made so that those systems may be put in good shape before winter, according to present plans.

Price Reduction Announced by Electro-Kold Corporation

A general reduction in prices ranging from $30 to $55 on all models of Electro-Kold refrigerators has been announced by the Electro-Kold Corporation, Spokane, effective Sept. 1.

The new prices are one of the moves in a fall electric refrigeration campaign being waged by all Electro-Kold dealers, according to E. S. Matthews, sales manager, with its objective the increased purchase of electric refrigeration.

Co-operate in Placing Fabricated Steel Buildings on Market

Buildings of steel, manufactured and erected on the unit principle, have been placed on the market on the Pacific Coast by Michel & Pfeffer Iron Works, of San Francisco, as the result of a co-operative undertaking between that firm, the Pacific Coast Steel Company and the Pacific Sheet Steel Corporation. The new structures will carry the trade name of "Coasteel."

Five types of buildings suitable for any class of industrial structure are being fabricated and carried in stock. The structural steel is produced and fabricated by the Pacific Coast Steel Company, the sheets for side walls and roofs are rolled by the Pacific Sheet Steel Corporation, and the sash and steel doors are manufactured by Michel & Pfeffer Iron Works.

One of the features claimed for the product is that all parts are hot-dipped galvanized. A complete engineering service will be maintained.

News Briefs

New Mexico Company to Build Dam in Santa Fe Canyon.—A reservoir, estimated to cost $350,000, is to be built in the Santa Fe Canyon by the New Mexico Power Company. The company's application for 3,500 acre-ft. of water a year recently was approved by George M. Neel, state engineer. The dam will have a maximum height of 113 ft. It will be 747 ft. long and 10 ft. wide at the top. Its storage capacity will be 2,979 acre-ft. of water according to information received. The application states that 450 hp. will be developed. Water will be used for domestic and irrigation purposes as well as for power.

Third Unit at Bonnington Falls About Completed.—Installation of a third unit of 20,000 hp. at the Lower Bonnington Falls power station of the West Kootenay Power & Light Company, Rossland, B. C., is now about completed, bringing the total installed generating capacity of the system to about 90,000 hp. Work will begin soon on a new development of this British Columbia utility at a site on the Kootenay River where preliminary work now is being done. The capacity has not been determined. The company is a subsidiary of the Consolidated Mining & Smelting Company, supplying power to the mining district of the lower portion of the province.

First Active Steps Taken in Construction of Wynooche Project.—The city of Aberdeen, Wash., has taken the first active step toward the construction of its proposed hydroelectric and water project on the Wynooche River. Diamond drilling has been started to determine the best location for the dam. The city has been given a written permit by the Simpson Logging Company to start development of the two projects and right-of-way for a new road will be surveyed and site for main construction camp selected immediately. Five tentative locations for the dam are being considered.

Edison Company Pushing Work on Vincent Line.—Work on the construction of the 220-kv. Vincent line is being pushed by the Southern California Edison Company and the lower half of the line from Magunden substation, near Bakersfield, to Laguna Bell substation, south of Los Angeles, is expected to be in operation early in 1927. The northern end of the line will be ready for use some time during the following year.

Seattle Proposes Low Rates for Power Used for Smelting.—As a means of bringing new industries to Seattle, an ordinance giving a very low rate for electricity used for smelting purposes has been introduced in the city council. The proposed rate will be four-tenths of a cent per kilowatt during the months of December, January and February, when the peak load on the city light plant is heaviest, and 3.42 mills the rest of the year. The rate applies only to loads in excess of 1,000 hp., and the consumer must purchase exclusively from the city all current he uses for light and power.

Application to Divert Water from East Truckee River Filed.—Diversion of 500 sec.-ft. of water for use in connection with a combined hydroelectric and irrigation project in Washoe County is sought in an application filed recently with the California Division of Water Rights by S. S. Wheeler of Reno, Nev. Plans contemplate the development of 11,023 theoretical horsepower. The application asks for permission to divert 75,000 acre-ft. of water annually for storage for irrigation purposes. Cost of the combined project is set at more than $1,000,000.

Service Line and Transformer
Transmission Line 110,000 Volts
Steel Transmission Line 60,000 Volts
BEHIND THE BUTTON
Highways
for Electric Service
POWER LINES of this Electric Service company reach out from the generating stations and cover the Inland Empire with a network of "highways" for the electric energy so vital to community comfort and development.
¶ Steel towers and the cedar pole lines carry this energy at high voltage and the service lines, in turn, distribute it to the very door of the customer.
¶ The "little black box" on the pole in your neighborhood is a transformer which reduces the voltage ready for use in the electric lamps, range and appliances within your home.
You Are Invited To Visit Our Power Stations
¶ With the power stations and the substations, the power lines are also at your service when you turn the electric switch or push the button.
The Washington Water Power Co.
Serving 45,000 customers in sixteen counties of Washington and Idaho
A29

One of a series of advertisements published by The Washington Water Power Company, Spokane, in an effort to familiarize its consumers with the mechanism of a power system. This is one method adopted by the company to portray what goes on "Behind the Button."

Women's Committee, Washington Water Power Company, Stages Resuscitation Demonstration.—The resuscitation team of the Women's Committee of The Washington Water Power Company, Spokane, recently gave a demonstration at the Community Center, Glover's Field, before a group of about thirty Indian women and a number of local club women during the Indian Congress. The demonstration accompanied a talk on accident prevention given by J. B. Fisken, consulting engineer for the company. The team was composed of Miss Edna Cottrell, Miss Norene Calfe, Miss Alfernia Culler and Miss Ruth Wilson.

Byllesby Company Surveys for Power Project on Middle Fork of Feather River.—Surveys for power house and reservoir sites for the proposed Bean Creek hydroelectric project on the Middle Fork of the Feather River have been begun by H. M. Byllesby & Company, Chicago. Actual construction work on the project will not be commenced until after receipt of permit from the Federal Power Commission, according to announcement by the company. The holdings on the Middle Fork of the Feather River to be utilized in the development were acquired from the Feather River Power Company. (Journal of Electricity, Oct. 15, 1925, p. 306.)

San Francisco to Survey Street-Lighting System.—A comprehensive survey of San Francisco's street-lighting system with a view toward complete elimination of antiquated gas lamps and their replacement by modern electric fixtures will be undertaken within the next few weeks. The proposed survey was authorized by the Board of Supervisors and approved by the mayor early in July. It is believed that a thorough survey of the lighting system will result in a substantial saving to the city. The absence of method in the development of street lighting has resulted in lack of uniformity and efficiency, according to members of the lighting committee of the Board of Supervisors. A plan is expected to be worked out, in conjunction with the Board of Public Works and the Department of Electricity whereby all lighting standards in the residential section will be brought to a uniform design.

Ranchers Protest Further Appropriation of Water from Skokomish River by Tacoma.—Complaining that the city of Tacoma's contemplated move of installing an additional unit to its Lake Cushman power project, lately placed in operation, would require the taking of most of the flow of the water from the south fork of the Skokomish River, forty-five ranchers living in the valley below the point of the proposed diversion have filed formal protest with the state hydraulics office urging that such action be restrained. The farms, dependent upon floods and irrigation, would be rendered worthless, it was claimed.

Geological Survey Completes Survey of Idaho Rivers.—A survey of power sites on the Snake River between Milner and Weiser, Idaho, on the Salmon River below Salmon, and on the Clearwater River and its tributaries, in Idaho, recently has been completed by the United States Geological Survey, and detailed maps have been prepared. These maps are now on file in the Boise office of the United States Geological Survey.

Seattle City Council Accepts Warranty Deed from Puget Sound Company for Two Substations Purchased.—The city council, Seattle, has accepted a warranty deed from the Puget Sound Power & Light Company for two substations purchased, but with the provision that this acceptance is not an admission that it will pay more than $119,734 for the properties. The company sets $185,000 as a fair price, and a court fight looms over this price matter. The substations are purchased under an agreement made when the city acquired the street railway.

Book Reviews

TELEPHONE COMMUNICATION.

By Charles Allen Wright, professor of electrical engineering, The Ohio State University; with the collaboration in the development of Part II and Appendix A of Albert Frederick Puchstein, assistant professor of electrical engineering, The Ohio State University. First Edition, 1925. 515 pages, 292 illustrations, 2 appendices, 26 tables. McGraw-Hill Book Company, New York. $5.

Specialization, so necessary in every activity of today, is the reason for limiting the detailed discussion in this book to "medium-frequency" alternating currents and electromotive forces, i.e., those of frequencies between 20 and 10,000 cycles per second.

The book is designed for use as a textbook "by students who are unfamiliar with literature on communication."

While the treatment of some phases of this broad subject is brief and general, valuable lists of references are given at the end of each chapter together with helpful questions and answers. Almost all of the fundamental electrical apparatus is illustrated even though the authors evidently expected a laboratory would be available to the classes so that they might carry out certain experiments outlined in an appendix. Another appendix contains electrical fundamentals which apply directly to medium-frequency apparatus and lines.

Holding to the premise of discussing only medium-frequency involves omission of chapters on signaling circuits and equipment but does not seem to exclude a chapter on the relation of wire telephony to radio telephony, which makes use of frequencies of far more than 10,000 cycles per second. A brief exposition of the signaling apparatus and connections would help to round out the general treatment of "communication," especially when one considers that the modern ringing frequencies are within the band defined by the author as "medium."

Maintenance of telephone plant is divided into two parts, maintenance of apparatus and circuits, and inductive interference and crosstalk. Both of these are well covered particularly from the practical standpoint.

Careful perusal of this book will help the reader better to understand the problems and accomplishments of one of the most interesting industries which, nevertheless, are accepted as commonplace today.

CONTROLLERS FOR ELECTRIC MOTORS

By H. D. James, B.S., M.E., Fellow A.I.E.E., etc. 522 pages, 444 illustrations, 6 x 9 in., cloth bound. Second edition, completely revised and enlarged, 1926. D. Van Nostrand Company, New York City. $5.

This is a treatise on the modern industrial controller, together with typical applications to various industries. The object of its preparation was to bring together in one volume sufficient material on control apparatus to give a good general idea of its design and operation. It should be of service to technical students, operating engineers and others interested in controllers and control equipment.

The text is divided into 38 chapters dealing with as many different phases of the subject. The first 10 chapters are devoted to more or less elementary discussions for the benefit of those of small experience with control apparatus including the making and reading of controller diagrams and different methods of motor acceleration. Roughly dividing the text further, the second 10 chapters discuss various types of apparatus and methods of control. The concluding 18 chapters give details concerning typical applications of the different types of control equipment to all of the important industries and their machines.

Foreign Developments.—Serial report of the prime movers committee, N.E.L.A. Gives progress made in steam power plants in Austria, England, France, Germany, Italy, Japan, Russia, Scandinavia and Switzerland. Published July, 1926. Price to members 25 cents.

Year Book of American Engineering Standards Committee, 1926.—This is a 76-page booklet giving the present status of the various standardization interests of the organization and other pertinent information. Published by the committee at 29 West 39th Street, New York City.

Guides for Specifications Covering Electrical Apparatus and Equipment.—Serial report of the electrical apparatus committee, N.E.L.A. Published July, 1926. The various aspects entering into the use of specifications both from the standpoint of the operating and the manufacturing companies are discussed briefly. The need for standardization in specifications is emphasized. Fourteen guides designed to aid in the preparation of specifications are presented. Price to members 30 cents.

Second Technical Conference of State Utility Commission Engineers.—This is Miscellaneous Publications No. 66 of the Bureau of Standards and is a detailed report of the proceedings of the meeting indicated by the title held in Washington, D. C., March 6 and 7, 1924. Price 15 cents.

Electric Power Survey—This is a survey made by the power survey committee of the N. E. L. A., Great Lakes Division, in collaboration with three adjoining divisions. Information has been drawn from all available sources for the preparation of this report. Numerous charts, diagrams, tables, maps and other illustrations make the information contained in the report readily understandable. For anyone interested in the power situation in the nine states centering roughly at Chicago, this 84-page report should prove to be of value.

Published by the N. E. L. A., the reports are available at the price of one dollar each.

A.I.E.E. News

A Meeting of the San Francisco Section will be held Friday, Sept. 17, at 7 p.m. in Yosemite Hall, Native Sons Building, 414 Mason Street, at which Cummings C. Chesney, president of the American Institute of Electrical Engineers, will be the principal speaker. His subject will be "Research and Standardization." Other speakers on the program will be F. W. Peek, Jr., who will discuss "Lightning," and K. B. McEachron, who will talk on "Lightning Protection." The meeting will be preceded by the usual dinner at Marquard's Cafe, Geary and Mason Streets, at 5:45 p.m.

Pacific Coast Electrical Association

Continuity of Committee Work in Engineering Section Now Showing Good Results

Advantages accruing from the vice-chairmanship plan now are making themselves obvious in the work of the Engineering Section. Most committees were organized completely and functioning prior to the sessions held in Los Angeles Sept. 1-3. Those that were only partly organized required but little time to complete the job and take up the studies of the 1926-27 term. Every committee had at least some preliminary reports ready for submission and discussion.

All business sessions except one were held in the office building of the Los Angeles Gas & Electric Corporation, where J. G. Rollow, section chairman, made full arrangements for the comfort, efficiency and convenience of those in attendance. The first executive committee meeting was held the evening of the first day at the Jonathan Club. At that meeting the intended programs of the various committees were verified and the work properly apportioned among them. Vice-chairmen for the coming year were selected, the list thereof to be published as soon as all appointments are confirmed.

Chicago Group Meeting

Continuation of the full co-operation with the Eastern geographic divisions is to be an important part of the work of the P.C.E.A. Engineering Section

for the present year. Those selected to go to the Chicago meeting Oct. 13-15 are as follows:

J. M. Gaylord, Southern California Edison Company, chairman hydraulic power committee.

M. S. Slaughter, The Southern Sierras Power Company, chairman accident prevention committee.

L. J. Corbett, Pacific Gas and Electric Company, chairman inductive co-ordination committee.

A. J. Hall, Ontario Power Company, chairman meter committee.

E. J. Crawford, San Joaquin Light & Power Corporation, chairman safety rules committee.

C. E. Young, Pacific Gas and Electric Company, chairman overhead systems committee.

J. G. Rollow, Los Angeles Gas & Electric Corporation, chairman Engineering Section.

Luncheon Meeting

Following an established custom, all delegates and many visitors attended a luncheon meeting held at the Elite Cafe the second day; the total attendance was 115. President Coleman of the P.C.E.A. was scheduled to speak at the luncheon, but was prevented by a severe illness. Those in attendance deeply regretted the president's ill fortune and authorized a telegram to that effect. "Jack" Frost, commercial manager, Southern California Edison Company, and first vice-president, P.C.E.A., spoke in place of Mr. Coleman. He commended the Engineering Section upon the serious nature of its work and upon the efficiency with which it was despatched, stressing the vital importance of the engineering achievements in the development of the electric utilities. Mr. Frost particularly emphasized the fact that it is the duty of every company employee to boost the greater use of electrical energy wherever and whenever possible.

Activities of the various committees are covered best by the brief reports of the chairmen presented in the following paragraphs:

Accident Prevention Committee

By M. S. SLAUGHTER, The Southern Sierras Power Company, chairman.

Of special importance in the work of the committee for the present year is the matter of full co-operation with the national committee. This is stressed in the hope of increasing the scope of accident-prevention work among member companies.

Further to increase the interest of company executives in this work it is necessary to prove concretely the value of such efforts. Also it is necessary to furnish plans for accident-prevention organization and to establish and maintain a close contact between the committee and the executives.

Safe-practice codes built around the code submitted to the committee last year by Dickinson and Jordan of the Pacific Gas and Electric Company, but varied to suit local conditions are recommended by the committee. Copies of that code are to be circulated among member companies.

Papers were presented by S. M. Bullis of the California Oregon Power Company on Educational Publicity by L. L. Dyer of the Southern California Edison Company on Safe Practices in Station Operation; and by D. G. Masey on Safe Practices on Construction Jobs. These papers are to be parts of a more complete study of those subjects.

Electrical Apparatus Committee

By H. A. LAIDLAW, Pacific Gas and Electric Company, chairman.

Six topics of study for as many subcommittees were decided upon:

Oil Circuit Breakers; Relays; Station Design Practice; Fire Protection and Prevention; Operating Methods, Routine and Experiences; Transformers and Regulators.

Each of these subjects aroused manifest interest and lengthy discussion.

Performance of automatic reclosing equipment came under the first topic. Manufacturers' representatives advised of the latest developments in contact designs and assemblies. An interesting example was cited of the use of slow motion pictures for the study of breaker operation. Relay discussions covered the latest developments and applications. Fire protection was a very live subject, bringing forth descriptions of operating experiences and various tests upon various types of extinguishers. Active discussion also took place concerning transformers and regulators. The chairman advised that it was the intention that the subcommittee consider only station-type power transformers, excluding distribution transformers.

Fuses and circuit breakers for the protection of transformer banks, automatic voltage regulators for range-load circuits, single-phase versus 3-phase regulators, proper relay protection for automatic reclosing circuits, effect of arc-furnace load upon service conditions, control batteries, charging equipment, water softeners, and cooling towers are some of the subjects eliciting discussion. Stress was laid upon the necessity of planning control circuits to prevent disruption from break-down of other equipment.

Two automatic stations of the Pacific Gas and Electric Company were covered in a paper submitted by R. B. Kellogg of that company. A. W. Copley of the Westinghouse Electric & Manufacturing Company gave some sidelights upon his company's latest developments, including a new rectifier for charging radio batteries, a light-sensitive vacuum tube, a 9-element oscillograph, and new a.c. network relay equipment.

Hydraulic Power Committee

By J. M. GAYLORD, Southern California Edison Company, chairman.

Dr. N. W. Cummings presented a final report of his research on evaporation from lakes and suggested certain further investigations which he believed would lead to useful results. The report was discussed by O. A. Wait, Dr. G. L. McEwen and others. The consensus of opinion appeared to be that the expense of applying the Cummings method to a power storage reservoir probably would be greater than the value of the more exact information to be obtained by this means. The method should prove useful, however, where more precise determinations are essential. By introducing certain approximations, it seems probable that a simpler method can be worked out which will give results sufficiently accurate for most practical purposes.

It was decided to complete the report on the theoretical part of the subjects of water hammer and speed-regulation of water wheels without waiting for experimental tests now in progress. A new subcommittee with S. F. Coghlan of the Southern California Edison Company as chairman will be formed to prepare a report on water-hammer tests.

Revision of the penstock report of 1923 was completed and will be embodied in a final report to be submitted to the national committee for publication.

Outlines of the proposed work of the year on penstock valves, pressure tunnels, handling of stored water, mechanical reliability of hydro-electric units, and penstock painting submitted by the chairman of subcommittees were discussed.

H. L. Doolittle, chairman of the national hydraulic power committee, discussed the work of his committee and asked for suggestions of additional subjects to be taken up. The subjects of stored water, pressure tunnels and penstock valves which originated on the Pacific Coast will be submitted for adoption by the national committe at its October meeting in Chicago. J. W. Andree of the Southern California Edison Company was appointed to serve on the national subcommittee on testing and operating records of water wheels. A new subcommittee will be formed to co-operate with national subcommittee on experiences with different types of dams.

Time did not permit a detailed discussion of the proposed work on silt deposits, but it was decided to continue this work by a subcommittee under Clinton De Witt of the Pacific Gas and Electric Company.

J. W. Andree presented a paper on the combined operation of hydraulic and steam plants, describing the methods used by the Southern California Edison Company in securing maximum system efficiency. The paper was discussed by W. D. Skinner of the Pacific Gas and Electric Company who stressed the importance of the savings possible by proper study of this subject.

Inductive Co-ordination Committee

By L. J. CORBETT, Pacific Gas and Electric Company, chairman.

Activities of this committee divide themselves under three heads.

1. Inductive Co-ordination Between Power and Communication Lines. This is the subject of the committee's original work. H. N. Kalb reported a case of a transmission line along a railroad where the railroad commission permitted longer barrels than would have been permitted under strict observance of General Order No. 52 of the commission. Mr. Corbett described the transposition method used on the Manteca-Salinas 104-kv. line in which both flat and triangular configuration are involved. J. O. Binney promised a report of the Edison company's Vincent telephone line exposure to the Vincent 220-kv. line. The Postal Telegraph Company's case with the Pacific Gas and Electric Company's Bay line between Sacramento and Suisun was described by Mr. Corbett. A portion of the Postal line was moved and successive tests showed the induction to have been reduced by 75 per cent of its former value.

2. Radio Interference. A report of the Pacific Gas and Electric Company covered 606 radio complaints against its lines during the first six months of 1926. In the same time 625 cases were cleared. The 11-kv. switches and cut-outs are the main source of trouble, but poor bonding and loose hardware contribute. That company has six "Radiola-26" sets and one Western Electric "4-B" set in use for investigating radio complaints. The Southern California Edison Company uses 2-tube Crossley sets in the districts, backed up by a "Radiola-26" for the use of the engineering department. The complaint form distributed to dealers by the Pacific Radio Trades Association was exhibited and its merits outlined.

3. Power-system Communication. (a) By telephone lines; methods of protection and testing were discussed and will be further reported upon with the view of standardizing at least elements of equipment. (b) By carrier current on high-voltage lines; comparative tests of three different types of equipment on the lines of the Pacific Gas and Electric Company were discussed. The Western Electric system in use by the Los Angeles Bureau of Power and Light and the General Electric system in use on the Edison 220-kv. lines were described.

Meter Committee

By A. J. HALL, Ontario Power Company, chairman.

The subcommittee on education of metermen has definite plans for two courses to be held next spring. One of these will be at the University of California, Berkeley, and the other at California Institute of Technology, Pasadena. Details of the courses now are being worked out.

The subcommittee on new developments has made great progress and will have a good report. Stress is being laid upon developments worked out by the utilities. Members present were greatly interested in a rotating standard developed by the Pacific Gas and Electric Company.

The committee on special tests and investigations is preparing papers for discussion at the next meeting.

Overhead Systems Committee

By C. E. YOUNG, Pacific Gas and Electric Company, chairman.

All subcommittee chairmen were present, their committee organized and reports ready for presentation. A brief outline of the proposed activities of the committee was presented by Mr. Young. In brief, the sessions of the committee covered the following:

H. Michener touched briefly upon practical features of tower-line construction and troubles which develop in the operation of high-voltage lines.

Corrosion of tower metal aroused lengthy discussion. E. R. Stauffacher, Southern California Edison Company, was appointed chairman of a subcommittee to study the subject of corrosion of tower metal and line hardware.

H. H. Buell reported on experiments conducted by some Eastern companies covering the frequent grounding of 4-kv. primary neutrals. Discussion regarding the use of a common ground for both primary and secondary followed.

J. E. Macdonald gave an outline of the work done during the past two years in connection with the revision of the railroad commission's General Order No. 64. R. O. Waltham of the commission reported upon the progress made in the revision of the order and outlined the most important changes. Joint-pole work was discussed and it was agreed that the committee should study the standardization of prices, pole numbering and similar subjects.

K. B. Ayres presented a report covering line switches and protective equipment. Discussion following involved the question of the best practice in connection with the use of 4-kv. and 11-kv. sectionalizing switches, cut-outs, fuses and the use of different fuse alloys, and high-voltage line switching.

L. J. Corbett in reporting on the standardization of pin and insulator threads announced that a standard insulator gage is well on the way to completion and that it checked closely with the N.E.L.A. standard. Discussion brought out the economy that would be effected by the adoption of such a standard, principally in the reduction of insulator stocks to be carried by the manufacturers.

H. H. Minor gave further information on the use of live-line tools. It was suggested that the committee make some definite recommendations regarding the special training of men for the use of such tools.

E. Y. Porter reviewed the subject of the treatment and life of poles, recommending the treatment of stubs. R. E. Cunningham gave some interesting information regarding methods of treating fir poles.

Prime Movers Committee

By C. W. WIGGINS, San Diego Consolidated Gas and Electric Company, chairman.

J. W. Andree made a preliminary report on standby plant design and operation. After the discussion which followed he stated that his committee will investigate methods of operating standby plants and costs of operating by the different methods, also methods of protecting the plants against corrosion and deterioration while out of service. Mr. Andree stated that it is doubtful if any plant should be designed as a standby plant because all plants usually become standby plants as more modern plants are built.

F. R. Knight, in a preliminary report of the boiler and turbine-room instruments committee, stated that it is the purpose of that subcommittee to make a comprehensive survey of instruments used by member companies, to determine those that have given complete satisfaction and to determine, if possible, the troubles they have had and the remedies applied.

A special study of methods of measuring fuel oil and of instruments for measuring noncondensable gases from condensers will be made.

F. G. Philo made a preliminary report on the operation of the No. 2 Long Beach plant of the Southern California Edison Company. He also presented some data on a new plant which the Southern California Edison Company is planning to build soon.

Mr. Philo stated that the new plant now being planned will contain a 100,000-kw. General Electric single-shaft turbine-generator with four vertical single-pass condensers. The boilers will be 3,400-hp. B.&W. cross-drum type operating at 450-lb. pressure and 1750 deg. temperature.

E. D. Sherwin outlined plans for the committee on boilers, furnaces and accessories.

Scott Jensen presented a most excellent preliminary report dealing principally with methods of cleaning condenser tubes and methods of locating leaks. Samples of split tubes were exhibited showing the effects of different methods of cleaning.

Safety Rules Committee

By E. J. CRAWFORD, San Joaquin Light & Power Corporation, chairman.

Testing facilities to be incorporated in entrance switches was reported upon by its subcommittee and a tabulation of data collected from member companies submitted. Indications are that something definite will be accomplished on this subject during the year. The matter is to be passed to a new subcommittee for completion.

The use of a common primary and secondary ground was discussed and held open pending communication with the overhead systems committee.

Safety regulations were discussed and an understanding reached as to co-operation with the national accident prevention committee. This committee is to study the code prepared by the national committee and make recommendations as to which rules should be adopted by P.C.E.A. companies.

State electrical safety rules received consideration. It was decided that at present there is none requiring the committee's attention.

The establishment of a general uniform or common ordinance throughout all California counties aroused extended discussion. Such an ordinance would assist in procuring safer and mode adequate electrical installations. The committee is to communicate with the California Electrical Inspectors Association and assist in every possible way the preparation and adoption of a uniform electrical ordinance.

Underground Systems Committee

By N. B. HINSON, Southern California Edison Company, chairman.

A report of the last (Kansas City) national group meeting was presented by H. H. Buell who also gave some interesting information regarding the 132-kv. cable installations under way in New York and in Chicago.

The problem of adequate heat transfer from cables through the duct and the enclosing concrete envelope was discussed. Some experimental installations have been made and definite results will be available in the future.

Cable testing with Kenotron equipment is to be carried on by the Los Angeles Bureau of Power and Light upon the final completion of the equipment installation now being made. A number of committee members visited the Bureau laboratory to see the equipment.

Manhole and transformer-vault construction discussion brought out the fact that the long, narrow vaults now used almost universally permit a stronger roof construction than the older type. They also require less street space, in width. Conduit, and particularly the monolithic construction adopted in the East for the 132-kv. cable lines aroused discussion. The use of powdered soapstone reduced the cable-pulling stresses by about 50 per cent on those jobs.

Electrolysis is another subject of considerable interest. A report covering surveys made on several systems is to be prepared by the committee. Joint use of duct lines by different utilities in light-load areas seems to have been proved economically feasible. Such practice reduces construction costs and is more or less analogous to the use of joint-poles.

Underground a.c. networks for the larger communities were recommended by R. R. Cowles who cited the success attendant upon such systems in Eastern cities. This aroused lengthy discussion. Consensus of opinion seemed to be that Western conditions do not justify the changes and additions that would be required by the adoption of such a system.

Next Section Meeting

Tentative plans contemplate the holding of the San Francisco sessions of the Engineering Section Jan. 12-14, 1927. This is subject to final confirmation at a later date.

Advertising-Publicity Section Discusses Direct-Mail Use

Jean Blum, manager of Blum's Advertising Agency of San Francisco, delivered a searching and comprehensive talk on the use of direct mail in electrical advertising at the afternoon open session of the Advertising-Publicity Section, Pacific Coast Electrical Association, held at the Palace Hotel in San Francisco Sept. 10. Richard E. Smith, advertising manager, Southern California Edison Company, Section chairman, presided. A number of visitors from the electrical industry attended the meeting to hear and take part in the discussion which followed Mr. Blum's paper.

"As an advertising medium," said Mr. Blum in a remarkable statement, "direct mail does not always justify its cost, but as a sales medium direct mail is the most effective tool in modern business. It co-ordinates but does not compete with any form of advertising."

Mr. Blum analyzed the possibilities with direct mail from the manufacturer's standpoint, the jobber and contractor's angle, and from that of the retail supply dealer. Beginning his paper with a survey of the industry, he stated that the industry represents 6,250 central stations, 1,800 manufacturers and jobbers and approximately 47,000 retail outlets. In the home field, he stated, was to be found the greatest potential market.

In the home field, Mr. Blum said, educational advertising was needed. Talking to the woman in the home, he said, requires an understanding of her problems as she sees them. Electrical advertising should try to remove prejudice due to fear of danger, costliness of the appliance and the intricacies of handling it. The mystery angle should be overcome, he declared emphatically. Advertising should stress the economy of consumption and lasting qualities of the appliance, Mr. Blum said, adding that charts are better understand than verbiage.

"I am stressing these points because it must be remembered that electrical appliances do not carry the same appeal to a woman as would wearing apparel or home furnishings," he went on to say. "Taking one point at a time and presenting it clearly and in plain language will accomplish more in electrical advertising than the use of large space and technical description covering too many angles. Unlike the industrial field, where facts and figures are necessary, the woman in the home will assimilate less of the facts and more of the information which appeals to her if given to her in small doses."

He outlined the forms of campaigns to be used for manufacturers and jobbers, then for retail supply dealers. One point made was that, "You can't expect the average dealer to present all the salient sales arguments about your product to his customers and prospects. He may have a large supply of a competing manufacturer's product on hand. His interest in your product may be limited to calls resulting from your advertising effort, while his sales effort may be easily swayed in favor of something else."

He outlined what he would do in a typical case of washing-machine selling as an example and read of the results obtained by various large organizations in the use of direct mail. Mr. Blum's talk was followed by lively discussion, many in his audience availing themselves of the opportunity to get his opinion and the benefit of his experience in answer to problems. J. Charles Jordan was chairman for the special discussion session.

During the morning business session of the Advertising-Publicity Section places of meeting and subjects for study for the year were decided upon. The next meeting is to be in Los Angeles in November, at which time the study topic will be "Behind the Scenes," or a discussion of the mechanics and detail of operating an advertising or publicity department in an electrical business. Dan Scott, manager public relations, Los Angeles Gas & Electric Corporation, was named chairman for that discussion, with J. Charles Jordan, manager publicity department, Pacific Gas and Electric Company, principal speaker.

Following this meeting, another will be held in San Francisco in February, and the subject will be "House Organs," with Frederick S. Myrtle, editor Pacific Service Magazine, presiding, and J. P. Coghlan, assistant to the president, Pacific Gas and Electric Company, principal speaker. At the meeting to be held in Los Angeles in April, with the subject, "Supplementary Advertising," R. G. Kenyon, Southern California Edison Company, will preside, and speakers qualified to represent all forms of advertising outside of newspaper and periodical advertising will be heard.

S. Waldo Coleman, president of the Pacific Coast Electrical Association, addressed the members of the Section informally at the noon luncheon, speaking of the interdependence of various departments in the operation of the electrical industry and of the part destined for advertising and publicity men. With increasing business the personal touch was being lost between the executives and the public and the employees, he said, and it was the duty of advertising and publicity men to bridge the gap and maintain contact between them. He said that he foresaw more participation by stockholders in company activities and that it was the duty of advertising men to keep them informed and familiar with the activities of the companies so that their confidence in the management would continue and that no obstacles would be placed in the path of efficient operation through ignorance of policies and methods.

News of the Electragists

Twenty-fifth Convention at Cedar Point Largest in Electragist Annals and Most Successful

With a registration of 850, the twenty-fifth annual convention of the Association of Electragists, International, at Cedar Point, Ohio, Aug. 24-27, was declared not only the largest in the history of the organization but one of its most successful as well. Speakers from all branches of the industry addressed the meetings.

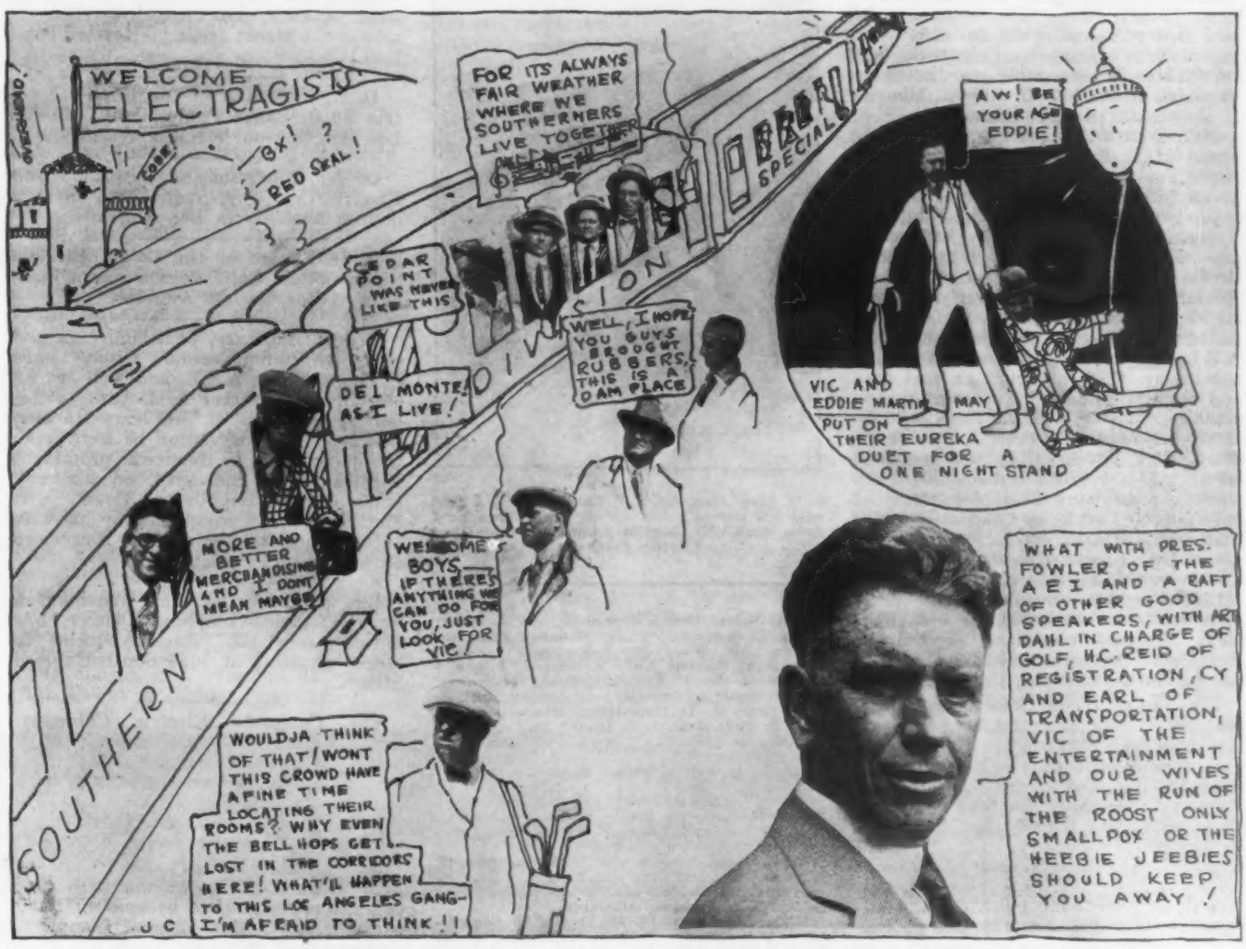
In the principal address on the opening day, Gerard Swope, president of the General Electric Company, laid stress on the necessity for good workmanship. "The public is perfectly able and willing to pay a fair price for a good article and a good service," he said. He maintained that there must be a fair profit and that electragists need to know costs and to account for them. He urged that the standards of business policy and practice being set up be regarded not maximum as requirements but minimum alone.

President Joseph A. Fowler in his address discussed the difference of opinion sometimes prevailing between central station and electragists on the trend in wiring. A joint conference of all four branches of the industry, he anticipated, would bring about better understanding on this point. "Something must be done," he said, "lest in our eagerness to get every house connected we accept the false philosophy of 'Better to be wired and burnt than never to be wired at all!'"

The James H. McGraw contractor-dealers' medal and purse for 1926 was awarded to Louis K. Comstock. Certificates of honorable mention were extended to Arthur L. Abbott, G. Fred Laube and Charles E. James. (Details of these awards appear in another article.)

W. Creighton Peet presented to the convention a most comprehensive report of the trade committee, analyzing the "balance sheet of distribution." This report held that the natural chan-

WILL YOU BE AT DEL MONTE, OCTOBER 1, 2, 3, WHEN NORTH MEETS SOUTH FOR THE CALIFORNIA ELECTRAGISTS' CONVENTION?


WELCOME ELECTRAGISTS
BX! ?
RED SEAL!
FOR ITS ALWAYS FAIR WEATHER WHERE WE SOUTHERNERS LIVE TOGETHER
SPECIAL
AW! BE YOUR AGE EDDIE!
CEDAR POINT WAS NEVER LIKE THIS
WELL, I HOPE YOU GUYS BROUGHT RUBBERS, THIS IS A DAM PLACE
DEL MONTE AS I LIVE!
VIC AND EDDIE MARTIN MAY PUT ON THEIR EUREKA DUET FOR A ONE NIGHT STAND
MORE AND BETTER MERCHANDISING AND I DONT MEAN MAYOS
WELCOME BOYS IF THERES ANYTHING WE CAN DO FOR YOU, JUST LOOK FOR VIC
SOUTHERN
WOULDJA THINK OF THAT/WONT THIS CROWD HAVE A FINE TIME LOCATING THEIR ROOMS? WHY EVEN THE BELL HOPS GET LOST IN THE CORRIDORS HERE! WHAT'LL HAPPEN TO THIS LOS ANGELES GANG- I'M AFRAID TO THINK!!
J C
WHAT WITH PRES. FOWLER OF THE A E I AND A RAFT OF OTHER GOOD SPEAKERS, WITH ART DAHL IN CHARGE OF GOLF, H.C. REID OF REGISTRATION, CY AND EARL OF TRANSPORTATION, VIC OF THE ENTERTAINMENT AND OUR WIVES WITH THE RUN OF THE ROOST ONLY SMALLPOX OR THE HEEBIE JEEBIES SHOULD KEEP YOU AWAY!

nels of distribution should be from the manufacturer to the jobber to the contractor-dealer to the public, and emphasized the necessity for keeping this balance. Where the contractor-dealer is passed by, the report demonstrated, not only is an injustice done to the contractor-dealer but the position of the industry is weakened economically and the balance upset.

Among other papers or talks presented the one by G. Fred Laube giving a description of the success in electrical merchandising he had experienced by means of sales policies he outlined, held attention. A series of practical papers on the technical and business problems of the contracting business occupied the second day of the convention.

C. J. Geisbush, executive secretary, California Electragists, Southern Division, reported the success of the estimating classes held in California. On Friday two symposiums on the following questions were held, namely: "Should there be set up an electragist standard for wiring installations?" and "Is state or municipal licensing of electrical contractors needed, and if so, in what form?"

McGraw Awards Presented at Cedar Point Convention

The second annual presentation of the contractor-dealer medal and purse given under the James H. McGraw Award was a feature of the opening session of the Convention of the Association of Electragists International at Cedar Point, Ohio. The bronze medal and the purse of $100 in gold were awarded to Louis K. Comstock, and certificates of honorable mention were extended to Arthur L. Abbott, Charles E. James and G. Fred Laube.

Mr. Comstock is chairman of the board of L. K. Comstock & Company, New York. The bronze medal was given him in recognition of his valuable work in linking the National Association of Electrical Contractors and Dealers and the International Brotherhood of Electrical Workers through the establishment of the council of industrial relations.

Arthur Abbott, technical director, A.E.I., was given certificate of honorable mention for his work on cost data and estimating for the association and establishment of estimating schools. Charles E. James, president, the Lektric Shop, Fort Pierce, Fla., was awarded certificate of honorable mention for his work in organizing Florida contractors and notable work in connection with that organization. G. Fred Laube, president, Laube Electric Company, Rochester, N. Y., also received the certificate for his unusually high class merchandising efforts in the establishment of an "electrical department store" and the influence he has had in raising merchandising standards.

The James H. McGraw Award was established last year by Mr. McGraw "to encourage constructive thinking for the advancement of the electrical industry." Its permanence has been secured by an endowment given into the keeping of the Society for Electrical Development. Each year four bronze medals are awarded, each accompanied by a purse, to those men who are judged to have done most for the advancement of the manufacturing, jobbing or contractor-dealer branches of the industry or to promote co-operation between any two or more branches of the industry. The judges appointed this year by the Association of Electragists to make the contractor-dealer award were: C. C. Bohn, J. C. Hatzel, W. Creighton Peet and George Wiederman. The presentation was made by Earl E. Whitehorne, commercial editor of the Electrical World, in behalf of the committee of awards.

California Inspectors' Committees Announced by President

Committees appointed by Ben C. Hill, city of Oakland, president of the California Association of Electrical Inspectors, to carry on the work of the association for the year, were announced recently by C. W. Mitchell, secretary. The chairman of each committee was asked by the secretary to get in touch with his committeemen so that the work of the association might progress. The list of committee personnel follows:

Articles of Association Committee.—H. N. Beecher, Los Angeles, chairman; J. M. Evans, Los Angeles.

Ordinance Statistics Committee.—C. W. Mitchell, San Francisco, chairman; G. E. Kimball, San Francisco; L. S. Bush, San Francisco; J. M. Evans, Los Angeles.

Ordinance Committee.—J. M. Evans, Los Angeles, chairman; O. Barnwell, Beverly Hills; James McConahey, Los Angeles.

D. M. Bird, electragist of Chico, Calif., caught with his sleeves rolled up all ready for a hard day's work. Mr. Bird is proprietor of the Bird Electric Company.

State Safety Orders Committee.—C. E. Hardy, Oakland, chairman; R. H. Manahan, Los Angeles; R. W. Wiley, San Francisco.

National Electric Code Articles 1, 2 and 3 Committee.—K. J. Bickel, Martinez, chairman; W. E. Brothers, Berkeley; C. Drathman, Redwood City; M. L. Hutchinson, Monrovia.

N. E. Code Arts. 4, 8, 12 and 13 Committee.—J. C. Hamilton, San Jose, chairman; S. F. Butler, Salinas; F. W. C. Butow, San Bruno; J. I. Dixon, Santa Clara; Walter Scott, Burlingame.

N. E. Code Arts. 5, 6 and 7 Committee.—H. N. Beecher, Los Angeles, chairman; J. H. Crannell, Glendale; Edw. F. Henzel, San Francisco; Fred Vore, Pasadena.

N. E. Code Arts. 9 and 19 Committee.—R. H. Manahan, Los Angeles, chairman; R. Edwards, Santa Barbara; J. M. Evans, Los Angeles; C. E. Jenkins, Alhambra.

N. E. Code Arts. 10, 30, 31 and 50 Committee.—C. E. Hardy, Oakland, chairman; G. E. Kimball, San Francisco.

N. E. Code Arts. 11, 16, 17 and 32 Committee.—H. W. Stitt, Fresno, chairman; C. R. Meikel, Bakersfield; R. P. Rothgeb, Modesto.

N. E. Code Arts. 14, 15 and 38 Committee.—C. W. Beaton, Sacramento, chairman; F. C. Colville, San Leandro; E. C. Gerry, Monterey; C. L. Heney, Eureka; F. A. Morrell, Stockton.

N. E. Code Arts. 18, 33 and 40 Committee.—A. E. Johnstone, San Diego, chairman; C. D. Felger, Colton; R. H. McKibbin, El Centro; J. W. Munn, Glendale.

N. E. Code Arts. 34, 35, 36 and 39 Committee.—J. M. Evans, Los Angeles, chairman; D. E. Graham, Burbank; H. A. Johnson, Ventura; J. McConahey, Los Angeles.

N. E. Code Arts. 37 and 60 Committee.—R. W. Wiley, San Francisco, chairman; A. V. Youens, Palo Alto.

Lee C. Baltzelle of the **Farley Electric Company** of Fullerton, and **H. W. Barnes** of **Barnes Brothers**, Pasadena, gave the first estimating lesson of the Electragist course at Santa Barbara recently, going from there to San Luis Obispo where they met the members of the Coast Electric Service Club. The club was holding its regular monthly meeting at Morro Bay on that occasion, and held its meeting following a dinner in a completely electrified cafe, which has about 25-kw. of installed load. The meeting was well attended and the estimating lesson given an enthusiastic reception.

Eugene Pineau, of the Pineau Electric Company, Los Angeles, is manufacturing electric fountains under the name of the Portable Electric Fountain Company. He has just established a fine display room on South Union Avenue, Los Angeles.

J. C. Holland has opened a very fine electric and radio shop at 5632 Pasadena Avenue, Los Angeles. This is across the street from his former location.

D. S. McMillan of McMillan's Electric Shop, Santa Paula, Calif., was in Los Angeles on business recently.

O. N. Robertson of the Robertson Electric Company, Santa Ana, spent a day on business in Los Angeles.

L. D. Spence of the **Colton Electric Shop**, Colton, Calif., was a recent business visitor to Los Angeles.

Ernest McCleary, past chairman and executive committeeman, Great Lakes Division of the A.E.I., and well known electrical contractor in Detroit, member of the firm of **McCleary-Harmon Company**, was a visitor in Denver to the home of **E. C. Headrick**, prominent Electragist of that city, on his way home from a trip to the Coast. Mr. McCleary was accompanied by his wife on his tour taking in San Francisco on his visit.

Gus Gramcko of the **Washington Park Electric Company**, Denver, has moved from 1207 East Alameda to larger quarters at 1048 South Gaylord Street.

The Coronado Electric Company, which formerly occupied a part of the **Coronado Radio Store**, at 1007 Orange Street, has moved into new and more spacious quarters of its own at 1146 Orange Street, Coronado, Calif.

R. W. Abright, city electrician of Long Beach, Calif., for the past four years, has resigned to become affiliated with the **J. W. Lane Electric Company**, electragist of that city.

Meetings

Meeting on Farm Electrification Held at Caldwell, Idaho

A convention of various interests concerning the subject of the use of electricity on farms in Idaho, was held at Caldwell, Idaho, recently. The principal subject under discussion was "The Relationship of Electrical Energy to Agriculture."

R. E. Shepherd, of Jerome, Idaho, president of the state Chamber of Commerce, was chairman, and in his remarks pointed out some of the activities of government projects in providing increased use of electricity on the farms of the state.

Dean E. J. Iddings, of the department of agriculture of the state university, told of the electrical development on the farms in eastern Idaho and particularly in the vicinity of Idaho Falls, making the statement that there is greater use of electricity in farm houses in Bonneville and neighboring counties than in any other section of the state and that the use is more varied. He recommended a study of conditions in that part of the state. He also stated that the state experimental farm near Caldwell is to be completely electrified.

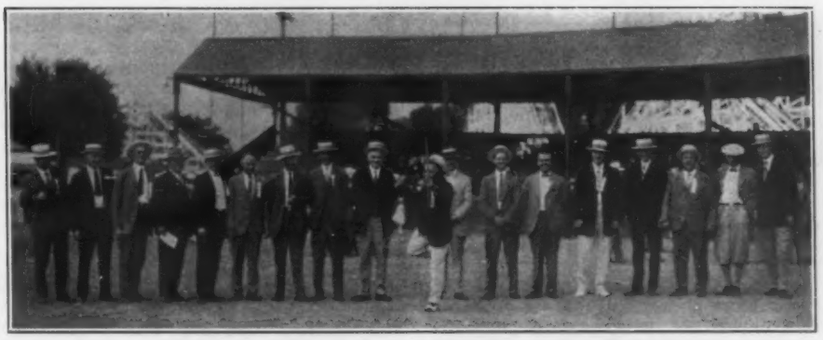
A large number of people, representing various interests, were in attendance at the convention.

Salt Lake Electrical Fraternity Holds Annual Outing

With a record attendance the annual outing of the electrical fraternity of Salt Lake City and adjacent territory recently was held at Geneva, Utah, a summer resort on Utah Lake, about 40 miles south of Salt Lake City. The outing was sponsored by the Rocky Mountain Electrical Co-operative League and was by far the most successful in the league's history.

Athletic events, in which electrical appliances were offered as prizes, featured the afternoon program. In the evening dancing was enjoyed. Practically all electrical concerns in Salt Lake City declared a half-holiday for the event, with the result that their employees and their families attended in large numbers and the "get-acquainted" spirit prevailed to a much greater extent than on similar occasions in the past.

The committee in charge of the affair consisted of W. A. Moser, of the Westinghouse Electric & Manufacturing Company, chairman; B. C. J. Wheatlake, of the General Electric Company; R. M. Bleak, P. P. Ashworth and M. L. Cummings, Jr., of the Utah Power & Light Company.



Some of the advisory board members of the Electrical League of Colorado lining up for a special stunt at the league's sixth annual picnic held recently in Denver. Left to right: E. P. Kipp, Fred E. Staible, W. R. Kaffer, D. D. Sturgeon, E. C. Headrick, E. A. Scott, W. A. J. Guscott, J. W. Ryall, B. C. Watts, A. C. Cornell (representing Cupid), chairman; J. J. Cooper, V. N. Garretson, B. J. Rowan, Clarence Keeler, F. F. McCammon, O. L. Mackell, C. S. Newell and Charles Addie.

Colorado League's Sixth Annual Picnic Is Happy Affair

One of the best frolics staged by the local electrical fraternity in the opinion of many who attended, was the recent sixth annual picnic of the Electrical League of Colorado, Denver.

A varied program had been prepared, and there was something happening all the time. There were foot races for big and little, a shaving race for the girls and a bean scramble for the boys, penny-pitching and tomato-eating contests, ankle and secret time races, dancing. Two special events were the penny-pitching contest for advisory board members in which D. D. Sturgeon won the prize, and the baseball game. A feature of much importance was the drawing for forty-four prizes, in which Miss Ellen M. Cornell, daughter of A. C. Cornell, chairman of the league, became the proud possessor of an Automatic washing machine.

Arrangements were in the hands of the following committees: prizes—Clarence Keeler, chairman, and Messrs. Cooper, Davidson, Headrick, Hodgson, Lawrence, Moore, Sturgeon and Walker. Sports—W. R. Kaffer, chairman, and Messrs. Addie, Adler, Bacon, Cargo, Foley, Garretson, Hancock, Mackell, Meriwether, McRoberts, Vaughan, Vosmer and Willoughby. Tickets—J. W. Ryall, chairman, and Messrs. Beck, Byrne, Easton, Fishburn, Gentry, Guscott, Rowan, Staible and Watts. Dance—K. L. Francis, chairman, and Messrs. Cornell, Elliott, Rubincam and Woolley. Gate—Dean Clark, chairman, and Messrs. Acers, Douden, Graveline and Rosenfield. Reception—A. C. Cornell, chairman, and Messrs. Scott, Semrad and McCammon.

COMING EVENTS

California Electragists—
Annual State-wide Meeting—Hotel Del Monte
Del Monte, Calif.
Oct. 1-3, 1926

Engineering Section, N.E.L.A.—
First Group Meeting,
Edgewater Beach Hotel, Chicago
Oct. 13-15, 1926

Northwest Association of Electrical Inspectors—
Annual Convention—Multnomah Hotel,
Portland, Ore.,
Jan. 18-19, 1927

S.E.D. Electric Refrigeration Advertising Committee Meets.—At a recent meeting of the electric refrigeration advertising committee of The Society for Electrical Development that has charge of the co-operative market development program careful consideration was given to the various details of the co-operative program now being carried forward on behalf of six member companies, the Delco Light Company, Kelvinator Corporation, Nizer Corporation, Servel Corporation, General Electric Company and Copeland Products, Inc. The committee also took action on recommendations for the next year's program which will be presented for the approval of the electric refrigeration executive committee at the conference scheduled to be held at Waldenwoods, Mich., Sept. 10-12.

Puget Sound Company's Southwestern District Employees Hold Annual Picnic.—The southwestern district of the Puget Sound Power & Light Company in Washington held its annual picnic at Spanaway Park recently with an attendance of 2,500. The features of the day were sports of all kinds, including two ball games, speeches by means of a loud speaker by R. T. Sullivan, district manager, W. H. McGrath, vice-president, and G. O. Snider. Mr. McGrath announced a plan for group insurance and pensions for all employees of the company.

The big electrical family of Salt Lake City and surrounding territory held the annual gathering of the clan at Geneva on Utah Lake this year. The outing was sponsored by the Rocky Mountain Electrical Co-operative League and, judging by the crowd, nobody stayed home.

Personals

D. C. Green, for more than two years vice-president and general manager of the Utah Power & Light Company, Salt Lake City, is the new president of the Northwest Electric Light and Power Association. By reason of his long experience in executive positions in the utility field Mr. Green is well qualified to discharge the additional duties incident to this position. After his graduation from Purdue University

D. C. GREEN

in 1908 he went to San Diego to enter the employ of the San Diego Consolidated Gas & Electric Company. Shortly afterward he was made manager of the Oregon Power Company and the Everett Gas Company of Everett, Wash. Early in 1915 he went to Salt Lake City as manager of the Utah Power & Light Company's Salt Lake division. In the fall of 1916 he left there, and until again becoming associated with that company in his present capacity was affiliated with various utilities in executive positions, having been vice-president and general manager of the Fort Smith Light & Traction Company of Arkansas just prior to returning to Salt Lake City. Mr. Green has taken an active part in the affairs of the electrical industry in the Northwest and a busy year for the association is expected under his administration.

D. L. Scott, manager of public relations for the Los Angeles Gas & Electric Corporation, acted as master of ceremonies at a luncheon at Pasadena during the Pacific Coast Gas Association convention. **Don C. Ray,** manager of public relations for the Pacific Gas and Electric Company, San Francisco, won a three-minute speaking contest held at the luncheon.

R. B. Wallbridge, manager of the Porterville office of the Southern California Edison Company for the past seven years, has been transferred to Santa Barbara to take charge of the company's office there.

S. Waldo Coleman, president, Coast Counties Gas & Electric Company, Santa Cruz, Calif., and president, Pacific Coast Electrical Association, has returned from a six weeks' trip to the Hawaiian Islands.

W. D. Brill, who for some time past has been traveling salesman for the Electric Appliance Company, San Francisco, in Contra Costa and Alameda Counties, recently departed on a three weeks' trip to Pittsburgh and other Eastern points.

Albert Meinema, who recently severed his connection with the Electric Appliance Company after an association of sixteen or seventeen years, has returned to San Francisco from an extensive Eastern trip.

Frank A. Leach, Jr., first vice-president and general manager, Pacific Gas and Electric Company, San Francisco, recently left for Quebec to attend the meeting of the Association of Edison Illuminating Companies to be held Sept. 27-Oct. 1.

H. J. Zweifel, formerly credit manager for the Electric Appliance Company of San Francisco, is now office manager for the McGraw-Hill Company of California.

C. E. Patterson of Bridgeport, Conn., vice-president of the General Electric Company, in charge of the merchandising department, and **W. H. Coleman,** manager of the merchandising department, central zone, with headquarters in Chicago, paid a brief visit to Denver the latter part of August.

Charles W. Munchow, fromerly associated with the Delco Light Company, Denver branch, has been appointed field representative of the Electrical League of Colorado, effective Sept. 1. Mr. Munchow is 36 years of age, and because of his wide acquaintance with architects and builders in the community it is believed that he will adapt himself quickly to league work and be in position to assist effectively in carrying out the constructive program outlined for the fall and winter months.

Frank Pergler, mechanical engineer of Prague, Czechoslovak Republic, who has been sent to this country by that city to inspect all types of engineering works, spent some time in San Francisco not long ago. Mr. Pergler had visited a number of the big power plants in the city and was about to inspect the city's Hetch Hetchy project. He was enroute to the A.I.E.E. meeting in Salt Lake City.

C. L. Buratti, of Johns-Manville, Inc., of California, Los Angeles, and a member of the Electric Club of that city, was a guest at a meeting of the San Francisco Electrical Development League not long ago.

Glenn B. Walker, superintendent of power sales, Utah Power & Light Company, Salt Lake City, recently returned from a six weeks' trip to Mansfield, Detroit, Cleveland, Pittsburgh, New York, Schenectady, Chicago and Denver. Mr. Walker has been making a study of industrial heating equipment and appliances as used in Eastern cities.

George A. Kumler, formerly with the Electric Maid Shop, Portland, has been placed in charge of the Whirldry washing machine department of the Fobes Supply Company and will divide his time between its Portland and Seattle branches.

Frank P. Withers, formerly service engineer for the Line Material Company of South Milwaukee, Wis., has become associated with the Illinois Electric Porcelain Company of Macomb, Ill., in the capacity of electrical engineer and in charge of the Chicago district office.

James F. Fogarty, vice-president, The North American Company, holding company for the Great Western Power Company of California, San Francisco, and the San Joaquin Light & Power Corporation, Fresno, Calif., recently visited both those cities.

Cummings C. Chesney, president, American Institute of Electrical Engineers, accompanied by F. W. Peek, Jr., after attending the Pacific Coast convention at Salt Lake City, have been making a tour of the Pacific Coast.

H. D. Tisdale, who sang two bass solos, and **W. A. Linsdell,** who accompanied him on the piano, added much to the program at a recent meeting of the Los Angeles Electric Club. Both are connected with the Southern California Edison Company.

Ladner V. Ross has accepted the position of illumination engineer with The Washington Water Power Company, Spokane. He was formerly with The Curtis Lighting, Inc., in Chicago.

Walter D. Koch, New York and Boston specialty man for the Graybar Electric Company, recently spent some time in Denver assisting in the washing-machine campaign being conducted by the Public Service Company.

G. H. Froebel, formerly manager of the marine sales department of the Westinghouse Electric & Manufacturing Company, East Pittsburgh, has been made central station sales manager with headquarters in that city. After leaving the University of Texas in 1909 he entered the employ of the San Antonio Gas & Electric Company and the San Antonio Traction Company, where he remained until 1912 when he left to work on the gathering of engineering data. Later in that year he joined the Westinghouse apprentice course, after which he was transferred to the company's office at Dallas, Texas, as salesman of industrial apparatus. Two years later he opened the Houston branch office as manager of the industrial division for the entire district, where he remained until 1918. Then he enlisted in the army, became a lieutenant in the construction divis-

G. H. FROEBEL

ion, and after the war went back to the Westinghouse company. He was made manager of the Houston branch office in 1919, and elevated to the managership of the marine sales department in 1923. Mr. Froebel recently visited the Pacific Coast in connection with a national tour made for the purpose of studying sales conditions in the electrical industry.

C. E. Magnusson, dean of the college of engineering, University of Washington, Seattle, has been appointed chairman of the student branches committee, A.I.E.E.

W. A. Knost, of the Illinois Electric Company, Los Angeles, served as a delegate from the Hollywood Post of the American Legion to the state convention recently held in Susanville, Calif.

Frank Ritz, formerly in charge of electric floor polisher salesmen for the B. C. Electric Railway Company, Ltd., Vancouver, has resigned to join the staff of the Northern Electric Company. He has been succeeded by **J. W. Philips.**

Henry Bostwick, of the Pacific Gas and Electric Company, San Francisco, and president of the Rotary Club in that city, was chairman of the day at the last meeting in August of the San Francisco Electrical Development League. Mr. Bostwick recently attended the Pacific Coast Gas Association convention in Pasadena and from there went to Los Angeles to be present at a meeting of the Rotary Club of that city.

W. Findlay, veteran electric range salesman for the B. C. Electric Railway Company, Ltd., Vancouver, has resigned to take up fruit growing at Vancouver Island near Victoria. Mr. Findlay had been connected with the B. C. Electric Railway Company, Ltd., for eighteen years and upon his retirement was presented with a gold watch chain as a mark of esteem.

H. N. Gooddell, district representative of the Graybar Electric Company with headquarters in Kansas City, recently covered the Denver and Salt Lake territories in the interest of the company.

George Bakewell, Jr., who has been acting as representative of the Electrical League of Colorado, with headquarters in Denver, since the death of S. W. Bishop, has been appointed executive manager of that organization. Mr. Bakewell is a native of Illinois and received his education in St. Louis, Mo. Upon his discharge from the army he

GEORGE BAKEWELL, JR.

entered the employ of the Emerson Electric Company in that city, but in 1920 removed to Denver and entered the newspaper field. In 1922 he became associated with one of the local advertising agencies and continued in that activity until his appointment in August, 1924, as league field representative, the position which he held at the time of the passing of Mr. Bishop.

H. H. Henline, associate professor of electrical engineering at Stanford University, Palo Alto, Calif., a short time ago was among the guests entertained by the San Francisco Electrical Development League at one of its regular meetings.

F. L. Easton, district manager of the Economy Fuse & Manufacturing Company, with headquarters at Denver, was a Salt Lake City visitor recently.

V. H. Griesser, chief engineer of The Washington Water Power Company, Spokane, delivered an illustrated lecture on the engineering features of the Chelan power project in central Washington before the Lions Club in that city a short time ago.

A. J. Schulthess, formerly superintendent of properties of the Spokane United Railways, has been made general superintendent of the company and manager of Natatorium Park. Mr. Schulthess succeeds the late **R. A. Willson,** assistant general manager, as operating head of the street railways in Spokane. The Spokane United Railways is controlled by The Washington Water Power Company.

Robert Miller, district representative of the General Electric Company, Denver, and member of the advisory board of the Electrical League of Colorado, recently returned to that city from a trip through Montana in the interests of the company. **B. J. Rowan,** Mr. Miller's assistant, recently made a trip to Pittsfield, Mass.

J. M. Lewis, president, Consolidated Lamp & Glass Company, Coraopolis, Pa., lately paid a visit to the Pacific Coast.

M. H. Herring, sales manager of the electrical publications of the McGraw-Hill Publishing Company, Inc., New York City, spent some time in San Francisco a short time ago. Mr. Herring has been making a tour through the Northwest and the Pacific Coast for the purpose of familiarizing himself with conditions in those sections.

Paul A. Dietz, of the miniature and automobile lamp department of the Edison Lamp Works, of Harrison, N. J., spent two weeks in Salt Lake City territory during August.

E. P. Kipp, western sales manager of the Hazard Manufacturing Company, Denver, is on an extended business trip over his territory. Mr. Kipp spent some time on the western coast and will include Salt Lake City in his itinerary before his return to Denver.

John J. Cooper, president of the Mountain Electric Company, Denver, attended the Glenwood Springs convention and served as chairman of the entertainment committee.

Glen Dunbar, who was electrical designing engineer on the Cushman power project developed by the city of Tacoma, has gone to Aberdeen, Wash., to take charge of all electrical construction for the proposed Wynooche water and power project which the city of Aberdeen will develop.

J. L. Kline, of the Western Light & Fixture Company, and **L. E. Clark,** of the Reiman Wholesale Electric Company, not long ago returned to Los Angeles from a trip to Alaska.

Orville Willoughby and **J. H. McRoberts** of the Wesco Company, Inc., Denver, are the president and vice-president, respectively, of the newly formed Mono Sales Company, Denver, distributors for the Ryan Aircraft Company of San Diego.

F. L. Hutchinson, national secretary, A.I.E.E., recently spent some time in San Diego and Los Angeles enroute to the organization's convention in Salt Lake City.

Obituary

Russell A. Willson, assistant general manager of the Spokane United Railways, died in that city Aug. 19. Con-

RUSSELL A. WILLSON

nected with the electrical industry of Spokane since 1905, including fifteen years with The Washington Water Power Company, Mr. Willson was a pioneer in the electrical business of the Pacific Northwest. He operated the first light and power plant in Ishpeming, Mich., in 1982, and constructed and operated the first light and power plant in Marquette, Mich., in 1895. He had been general manager of the light and power, gas and street railways in Helena, Mont., for seven years when he joined The Washington Water Power Company in 1905 as assistant to the general manager. He held that position until 1908 when he was made head of the street railway department of that company, the position he held until 1922 when the Spokane United Railways was formed and he was made assistant general manager. Mr. Willson invented the Hotpoint ovenette, a signal and train stop for electric interurbans, an insulator support used by The Washington Water Power Company, a novel design of street car trucks, a sliding door arrangement for street cars and scores of other ideas for the street railway, light and power and other business.

H. T. Mitchell, Pacific Coast representative of the Consolidated Lamp & Glass Company and the Reliance Metal Spinning Company, with headquarters in Los Angeles, died recently.

Stephen T. Snow, purchasing agent, Graham-Reynolds (formerly Holabird-Reynolds) Electric Company, Los Angeles, died in that city Aug. 27. He had been connected with that concern for about twenty-two years. He was a native of Oakland, Calif.

Henry C. Claussen, partner in the firm of Claussen Brothers Electrical Works, Denver, died in that city Aug. 10.

TRADE NOTES

The Standard Electric Stove Company, Toledo, Ohio, has issued Catalog 15 showing its complete line of electric ranges, with itemized description of each model. In the foreword under "Facts and Figures" the design, construction, efficiency and special features of the Standard ranges are discussed. The last part of the book is devoted to heavy-duty ovens, toasters, broilers, griddles, hotplates, ovens and plate warmers, fireless cookers, serving tables, water heaters, coffee urns and urn heaters, accessories and repair parts.

L. E. Kincaid, 33 Twenty-ninth Street, San Francisco, has been appointed distributing agent for the Walker dishwasher in the northern California territory. The dishwasher has been on display in the Building Materials Exhibit in the Monadnock Building, San Francisco, and Mr. Kincaid has made arrangements for its distribution through dealers in a number of localities.

The B. K. Sweeney Electrical Company, Denver, has entered the jobbing field after twenty-five years of service as manufacturers' representatives, and has discontinued acting as agents for all manufacturers with the exception of the **Ansonia Electrical Company, Weston Electrical Instrument Company,** and **New York Insulated Wire Company.**

Robbins & Myers, Springfield, Ohio, have circulated an attractive broadside, "Sale Finders and Sale Makers for 1926," in which its outlines display and sales suggestions on electric fans.

The Economy Fuse Company, San Francisco, has removed its offices in that city from the Rialto Building to the Call Building, according to announcement of **George T. Bryant,** district sales manager.

The Electric Corporation of Los Angeles has acquired the business of the Electric Appliance Company, 809 Mission Street, San Francisco. Plans are under way for changing the company's headquarters to 145 Ninth Street, corner of Minna Street.

The Cutler-Hammer Manufacturing Company of Milwaukee and New York has developed and placed on the market a new device for automatically controlling the acceleration and braking of a.c. motor-driven equipment. It is called the Carpenter automatic control station, and has been applied extensively to cylinder presses, web presses, lithograph presses and other printing equipment, although its field of application extends to numerous types of motor-driven machinery on which it is desirable to control the speed of acceleration and to produce a braking effect. The station is used in connection with the standard types of automatic push-button-operated magnetic controllers which are employed for the control of slip-ring motors, although it can be used also with controllers for squirrel-cage motors.

Electric Sales-Service Company, San Francisco, has issued a small folder descriptive of its air heaters and water heaters. Two types of air heaters are pictured.

Parr Metal Products Corporation, 3519 Forty-first Street, Long Island City, N. Y., announces that its line of steel cabinets for the electrical trade includes almost every type for various electrical devices. It makes cutout boxes, entrance switch boxes, panelboard cabinets, junction boxes, and steel cabinets for enclosing rheostats, fire-alarm apparatus, relays, contactors, controlling devices, and electrical apparatus of similar nature.

"All wet" or not "all wet"? It certainly looks all wet but the 200 folks more or less who took part protest that as a party it was very far from being "all wet," and also that it was entirely "dry." Be that as it may, the annual swimming party of Chapter 10 of the Doherty fraternity at Boulder, Colo., was voted one of the most successful "get-togethers" in the history of the branch. Of the 350, including employees of the Public Service Company of Colorado at Boulder and their families, and a delegation of 20 from Denver, that attended, more than 200 immersed themselves in the Hygienic Pool where the party was held. There were swimmin' races 'n' everythin', and many were the candidates for the laurels of Duke Kahanamoku and Gertrude Ederle. And as for aspirants to the ranks of a certain well known bevy of bathing beauties—well, take a look at the picture.

The King Company is the new name of the former King Manufacturing Company, Chicago, which announces that the King Company, Los Angeles, has been succeeded by the Western Lighting Company. The King Company recently commenced operations in a new plant at Muscle Shoals, Sheffield, Ala.

Mono Sales Company, Denver, a newly formed organization which is the Colorado distributor for the Ryan Aircraft Company of San Diego, Calif., has as officers Orville Willoughby, president, and J. H. McRoberts, vice-president, both of the Wesco Company, and Ralph J. Hall, secretary and treasurer, who is associated with C. H. Parker & Son.

The Beaver Machine & Tool Company, Inc., Newark, N. J., has placed on the market what promises to be a most popular improvement in attachment plugs. The new feature consists of the cap portion of the standard separable plug being made in the form of an elongated handle. This handle cap gives the user a substantial article to get hold of and facilitates directing the brass blades in the slots. It is especially convenient when one is endeavoring to insert the plug into a lighting fixture with the shades in place. The brass blades are made somewhat longer than standard so the plug will hold in more securely. The long handle is furnished in polished black material and the rim is protected by a nickeled steel ring, making the whole piece a very sturdy plug. The intended retail price is 35 cents.

The Chicago Fuse Manufacturing Company, Chicago, has brought out new large 4-in. switch and receptacle boxes in both the Gem Locktite and Gem bracket types. These larger boxes provide greater amount of wiring space and because of this are used also for wall bracket outlets. The Gem 4-in. Locktite has the same steel supporting bars as the standard Gem Locktite boxes for quick secure mounting, is provided with knockouts for loom, sheathed cable, flexible and rigid conduit and has provision for fixture stud in bottom. These boxes may be installed either perpendicular or hozizontal. Catalog NT boxes are provided with new wide clamps. Gem 4-in. bracket boxes are similar. The bracket attachment makes installation easy and quick, no mounting bars being required.

Arthur E. Bacon, manufacturers' representative, has moved from the Patterson Building to the Radium Building, 1429 Eighteenth Street, Denver.

The Westinghouse Electric & Manufacturing Company, East Pittsburgh, has issued leaflet No. 20,288 describing special distribution transformers for electrically operated shovels.

The Ludlum Steel Company, Watervliet, N. Y., has announced that the second edition of its Tool Steel Hand Book is just off the press. It describes in detail carbon, alloy, rust and heat-resisting steels, their use, methods of treating, etc.

The Electro-Kold Corporation, Spokane, has announced that the **Scott Buttner Electric Company,** 19 Grand Avenue, Oakland, Calif., will act as its East Bay distributors of Electro-Kold refrigerators. The company recently issued a circular describing its new steel-constructed boxes with all-porcelain finish.